Hospital Library

VOLUME IX • NUMBER 1

JOURNAL of the AMERICAN DIETETIC ASSOCIATION

May, 1933

The Importance of Relative Iodine Deficiencies in Certain Forms of Goiter
DAVID MARINE, M.D.

The Comparative Digestibility of the Doughnut
ARTHUR H. SMITH, W. E. ANDERSON, R. O. BROOKE AND W. G. GORDON

Calcium and Phosphorus Metabolism of Normal Pre-School Children. II. Successive Balance Studies Showing the Range of Variation in Calcium and Phosphorus Storage
THELMA PORTER-LEVIN

Feeding Students a Low-Cost Diet in a University Cafeteria
FLORENCE QUAST AND HELEN STRAND

Food and the Mind
EARL D. BOND, M.D.

THE AMERICAN DIETETIC ASSOCIATION
Business Office: MOUNT ROYAL AND GUILFORD AVENUES, BALTIMORE, MARYLAND
Advertising and Subscription Offices: 185 N. WABASH AVENUE, CHICAGO, ILLINOIS

VOLUME IX · May, 1933 · NUMBER 1

JOURNAL *of the* AMERICAN DIETETIC ASSOCIATION

THE IMPORTANCE OF RELATIVE IODINE DEFICIENCIES IN CERTAIN FORMS OF GOITER[1]

DAVID MARINE, M.D.

THE etiology of goiter has occupied the attention of medical men as far back as history goes. The views held at any given time have reflected the general stage and state of medical thought. Thus in the pre-Roman period it was believed that carrying heavy loads on the head was a cause of thyroid enlargement, while during the Roman period drinking snow and glacial water (because of the prevalence of goiter in the Alps) was considered an important cause. During the early Renaissance, goiter was considered a miasmatic disease. With the development of chemistry a great number of the elements, including sulphur and the salts of calcium, magnesium, iron, fluorine and silicon, were at one time or another suspected as etiological factors. With the rise of bacteriology and protozoology, likewise, numerous attempts have been made to associate some specific organism or its toxin as a cause, but so far no proof of a *contagium vivum* as a cause of goiter exists.

Diet has been considered a factor for many centuries, and that its importance in relation to thyroid function has increased down to the present time I hope this paper will indicate. One of the earliest views was that fat in excessive amounts, especially pork fat, was believed to be a cause; and modern physiological studies indicate that the thyroid hormone is important in the oxidation of fats.

Long before we knew anything about deficiencies of specific elements as causes of disease, the Hindus and Chinese knew the value of salt in the treatment and prevention of goiter. The South American Indians were aware that salt and seaweed were beneficial (Humboldt), and burnt sponge was a well-established pharmacopeial remedy for goiter used by the Greeks (Dioscordes). The beneficial effects of salt, of seaweed, of

[1] Presented before the American Dietetic Association, November 10, 1932.

sponge-ash and many other products of the sea are now known to be due to the iodine they contain, following its discovery by Courtois as an element in 1811 and its introduction into medicine by Coindet in 1820. The discovery by Baumann in 1895 that iodine is a normal constituent of the thyroid led at once to an enormous amount of work, which in the space of the next fifteen years clearly demonstrated that iodine in an organic compound was the essential secretion of the gland. This iodine-containing compound was later isolated in crystalline form by Kendall, and named by him "thyroxin." Due to the recent efforts of Harington, thyroxine is now made synthetically. During this period iodine was found to control thyroid enlargement, that is, if the gland was enlarged the iodine store in the gland was low, and if one gave small amounts of iodine by any means and in any form, the iodine store was markedly raised and enlargement of the gland could thus be prevented. At the present time the prevention of goiter by the use of iodine is practised in many countries and will eventually eliminate endemic goiter and to some extent Graves' disease.

All the facts acquired by studying the chemistry, physiology and pathology of the thyroid support the view, now generally accepted, that goiter is a work or compensatory hypertrophy of the thyroid and is always dependent *immediately* upon a deficiency of iodine. The fundamental or ultimate cause or causes of goiter are still unknown.

In the first place, the deficiency of iodine may be *absolute*, that is, the intake through food and water is below the average normal needs of the organism for the thyroid hormone. This partially explains why goiter is more prevalent in certain regions of the world. In such regions, as was first shown by Chatin in 1852, the iodine in the soil, water and foodstuffs grown on such soils is low in iodine, while in the coastal plains the vegetation and water are much richer in iodine.

In the second place, the iodine deficiency may be *relative* or *secondary*, or in other words, the iodine intake may be normal or even much greater than normal, but owing to increased demands of the body for thyroxine the iodine is utilized so rapidly that it cannot be held in the thyroid in sufficient concentration to keep the gland from enlarging. (The effective concentration of iodine is about 1 mg. per gram of dry thyroid.) Such relative iodine deficiencies account for the thyroid enlargements occurring in exophthalmic goiter; in goiter produced in brook trout by feeding liver; in mice by feeding oatmeal; in rabbits by feeding cabbage or other *Brassicae*; and in the goiter of adolescence and of pregnancy.

In the third place, thyroid enlargement may be due to, and is certainly

more frequent and severe when a *combination* of an absolute iodine deficiency occurs *simultaneously* with an increased demand for thyroid function.

The thyroid enlargements due to a deficient intake of iodine are easily understood, while those due to a relative deficiency of iodine involve many factors of a complex nature; and it is the principal purpose of this paper to call to your attention, and to sketch some of the recent work with one of these secondary or relative iodine deficiencies.

As already mentioned, exophthalmic goiter is perhaps the one relative iodine deficiency with which dietitians are most familiar, but I shall not discuss this disease because the groundwork for an experimental approach is not yet available.

The thyroid enlargement which can be produced in rabbits by feeding cabbage as the principal food will serve better to illustrate the importance of diet and the existence of other substances which markedly influence the thyroid gland by changing the needs of the organism for the thyroid hormone. Chesney and Webster discovered that cabbage would produce goiter in rabbits when fed as the sole or principal article of diet. In attempting to analyse this observation, we found that only cabbage maturing in the late autumn was effective and even this was frequently ineffective. There were great seasonal and annual variations in its effectiveness. Drying cabbage in air or *in vacuo* entirely destroyed or removed the goiter-producing principle. Steaming for one hour did not reduce and often enhanced its potency. It was further found that the goiter-producing factor was not very soluble in water and that steamed hashed cabbage could be leached several times with water without appreciably injuring its goiter-producing capacity. The goiter-producing principle could be extracted with ether. Extensive experimentation has shown that the goiter-producing quality was partially independent of the iodine content; that is, the iodine content could be high and the goiter-producing quality high, or the iodine content low and the goiter-producing power low.

It was evident from all these observations that there was present in cabbage a factor capable of producing goiter which was quite independent of the iodine content of the cabbage. On looking into the chemistry of the cabbage family it was found that mustard oils or isothiocyanates were always present and represented the specific chemical characteristic of the *Cruciferae*. Further, it was found that organic cyanides or nitriles had been isolated as such from several of these plants and that it was possible under certain conditions of distillation to reduce a mustard oil to its

corresponding nitrile. The idea that cyanides might cause thyroid hyperplasia by their well-known effect of blocking oxidation processes in the body suggested itself; on testing the least toxic of these nitriles—acetonitrile—it was found that it produced goiter in rabbits more readily than cabbage when given subcutaneously in doses varying from 0.05 to 0.1 cc. daily to immature animals maintained on a diet of dry alfalfa hay and oats. Later work has shown that both the organic and the inorganic cyanides produce more or less of this thyroid effect, but that acetonitrile from the practical point of view was best because it liberated hydrocyanic acid in the organism more slowly and over a longer period. The particular nitrile present in cabbage has not yet been identified chemically.

These studies offered a reasonable explanation of why amounts of iodine, greatly in excess of what normally prevents thyroid hyperplasia, may not prevent it; apparently the cyanide had by some means markedly increased the needs of the body for thyroid secretion. The presence of a nitrile in cabbage offered an adequate explanation of why cabbage with a high iodine content caused goiter, but did not satisfactorily explain why cabbage with a low iodine content often had no goiter-producing quality or why fresh fruit and plant juices, also of low iodine content, could entirely protect rabbits from thyroid hyperplasia even though cyanides in adequate amounts were given. Suspecting that the reducing factor which Szent-Györgyi had isolated from orange juice, cabbage and suprarenal cortex in 1927, and identified by him as an hexuronic acid, might be involved in the mechanism by which plant juices prevent goiter, we found that the goitrogenic quality of cabbage was inversely proportional to its hexuronic acid content (as determined by iodine absorption). On the other hand, the potency of fresh plant and fruit juices in preventing cyanide goiter was found to be directly proportional to the amount of this reducing factor present in the juice.

It now seemed certain that there were substances other than iodine in fresh fruits and vegetables that could protect rabbits against thyroid hyperplasia due to cyanide.

Attempts to determine the chemical nature of this antigoitrous factor in fresh fruits and vegetables have so far not been successful, although all the results strongly suggest that hexuronic acid (now identified as vitamin C) is the substance which protects rabbits against cyanide goiter. Hexuronic acid is known to be concerned in the physiological processes which bring about oxidations and reductions in the body. We therefore are apparently familiar with two antigoitrous factors. (There may be many

others just as there may be many other goitrogenic factors.) The first of these is iodine, which prevents goiter by supplying the essential constituent of normal thyroid secretion and makes it possible for the thyroid to produce all the hormone needed without enlarging. The second substance (hexuronic acid ?) probably prevents thyroid enlargement by aiding the thyroid in promoting tissue oxidations and in this way exercises a thyroid-sparing action indirectly, or directly by neutralizing substances having a cyanide-like action.

This brief account of why cabbage sometimes does and again does not cause goiter in rabbits will serve to emphasize the importance of specific variations in the chemistry and physiological action of a given foodstuff, and the importance of diet and nutritional states in thyroid diseases; it is also an excellent example of what is meant by relative iodine deficiences.

As already mentioned, exophthalmic goiter and simple goiter of adolescence are also examples of a relative iodine deficiency and their solution must be sought along the same line as that followed in the experimental study of goiter produced by cyanides.

It is now certain that a deficiency of iodine, while highly important as the *immediate* cause of all functional thyroid enlargements, is actually only one of the factors involved and probably in most forms of goiter it is not the fundamental factor. Further understanding of the nature of the various forms of goiter may very well be a by-product of investigations into the ways and means by which the normal animal brings about and controls oxidation and reduction processes in the body.

THE COMPARATIVE DIGESTIBILITY OF THE DOUGHNUT*

ARTHUR H. SMITH, W. E. ANDERSON, R. O. BROOKE AND W. G. GORDON

From the Department of Physiological Chemistry, Yale University, New Haven, Connecticut

THE doughnut occupies a unique place among bakery products from the point of view of dietetics. It has, in general, the nutritive value of breads and cakes but, because of the manner of preparation, the content of fat is considerably increased. Due to this circumstance the caloric value of doughnuts is relatively high. It has long been recognized among nutritional physiologists that fats and foods rich in fat leave the stomach more slowly than do either carbohydrates or proteins, a fact explaining the "staying" qualities of foods such as fatty meats and pastry (1). Part of the popularity of the doughnut undoubtedly rests upon a feeling of satiety following its consumption as much as upon its contribution to the daily requirement of energy.

An indication of the importance of this food article in the national dietary may be gained from the estimate that 201,000,000 dozens of doughnuts, crullers and other fried cakes are consumed annually in this country and that the value of this product is approximately 40 million dollars (2).

In contrast to the popularity of doughnuts among certain groups is the apprehension among others that the consumption of this food will inevitably lead to a vague discomfort or actual gastrointestinal distress, and doughnuts are therefore considered to be indigestible. Granting that this is generally an uncritical use of the term "indigestible," one may well inquire whether or not the constituents of properly cooked doughnuts are less well-digested in the organism than is an equal quantity of the same nutrients of similar quality in a different form. An answer to this question would have an important bearing on the place of doughnuts in the ordinary dietary. The present account describes a series of experimental studies on the digestibility of doughnuts by man.

PLAN

Six normal men served as subjects. Some of them were medical students, others were experienced research workers in biochemistry and all were cognizant of the importance of complete consumption of food and of the significance of accurate collection of excreta. The ages ranged

* Aided by a grant from the Doughnut Machine Corporation. Received for publication December 12, 1932.

from 23 to 43 years, and the body weights at the beginning of the study from 51.9 to 76.1 kilos (*see* table 1).

The apparent digestibility of protein, fat and carbohydrate was determined in the conventional manner by comparing intake with outgo in the feces. In addition, the retention of calcium and phosphorus was measured, as were also the titratable acidity and pH of the urine.

TABLE 1

Data on subjects

SUBJECTS	AGE	HEIGHT	BODY WEIGHT (KILOS)			
			Period I	Period II	Period III	Period IV
		cm.				
A	43	181.0	76.1 begin	74.1 end	74.0 begin	72.4 end
D	29	178.0	72.7 begin	71.8 end	71.8 begin	71.4 end
G	24	173.0	65.5 begin	65.3 end	65.4 begin	64.7 end
H	24	170.5	60.5 begin	60.0 end	61.0 begin	59.6 end
P	23	165.0	51.9 begin	51.3 end	51.0 begin	51.1 end
S	24	176.5	70.6 begin	68.2 end	68.8 begin	67.0 end

In order that the study might apply as closely as possible to customary dietary practice, a ration well-balanced according to current nutritional standards was provided. The diet consisted of choices of the following foods in self-determined portions:

Breakfast	*Lunch*	*Supper*
cereal	lettuce	meat
bread	tomato	egg
butter	egg	potato
milk	mayonnaise	carrot
jam	bread	tomato
orange	butter	mayonnaise
coffee	milk	ketchup
sugar	bananas	butter
doughnuts	cookies	bread
	doughnuts	milk
	coffee	orange
	sugar	bananas
		cookies
		doughnuts
		tea
		sugar

As far as possible, standard brands of food were employed and analyzed only once. The best quality of bottom round steak was carefully

trimmed of fat, ground twice, weighed out, wrapped in wax paper and stored in a refrigerator at 31° to 33°C. Sufficient meat was purchased to last 5 days. Five analyses were made of the various lots of meat; 4 analyses were performed on the vegetables and on the doughnuts.

The doughnuts used in this study were made from a mixture consisting of the following carefully selected and analyzed ingredients: sugar, wheat

TABLE 2

Average analyses of foods, per cent based on food as consumed

FOOD MATERIAL	MOISTURE	TOTAL NITROGEN	FAT	CARBOHYDRATE	ASH	CALCIUM	PHOSPHORUS
Cereal	10.2	1.98	1.3	72.0		0.056	0.285
Bread	35.5	1.4	2.9†	54.5		0.031	0.059
Cookies	2.7	1.1	23.0†	69.4		0.049	0.120
Mayonnaise	16.5†	0.2†	76.2†	3.8†	2.0	0.021	0.051
Ketchup		0.4	0.2*	25.3		0.010	0.052
Jam				68.8		0.023	0.013
Eggs	73.4	2.2	11.4			0.066	0.208
Butter	15.8‡	0.16	80.7‡		2.5‡	0.018	0.050
Milk		0.5	3.85§	5.0*		0.122	0.090
Doughnuts	19.6	0.85	26.0†	49.5	1.6	0.056	0.300
Meat	67.2	3.1	10.5			0.021	0.197
Tomatoes	94.2	0.2	0.2*	3.5*		0.010	0.032
Lettuce	96.3	0.2	0.3*	2.2		0.018	0.022
Carrots	86.7	0.2	0.4*	8.1		0.044	0.048
Potatoes	79.7	0.4		19.5		0.008	0.065
Orange		0.2	0.2*	10.1		0.015	0.020
Banana		0.2	0.6*	21.3 Periods I and II 25.7 Periods III and IV		0.008	0.033

* Atwater, W. O., and Bryant, A. P., Bull. 28, U. S. D. A. (1906).

† Some of the individual analyses made in the Analytical Laboratory, Connecticut Agricultural Experiment Station.

‡ Analysis submitted to Committee on Foods, Council on Pharmacy and Chemistry, Am. Med. Assoc. *See* J. A. M. A., 96: 861, 1931.

§ Composite analysis made in the laboratory of New Haven Dairy.

flour, egg yolk, milk, shortening, salt, baking powder, flavors and spices. The doughnuts were fried for 105 seconds in electrically-heated hydrogenated vegetable fat, kept at a constant temperature of 193°C. The finished product was then cooled in a conditioned atmosphere and consumed by the subjects within a period of 30 hours. The average analyses of the foods as employed in the calculations are given in table 2.

The first adjustment interval, during which the diet was selected, was

of 4 days' duration and was followed by Period I (6 days). Immediately thereafter another adjustment interval of 3 days was instituted during which the dietary regimen of the subsequent Period II was adhered to. This was followed by Period II (6 days). After a free interval of 3 days, the entire experiment was repeated and data for Periods III and IV obtained exactly as for Periods I and II. Collections of excreta were made during Periods I, II, III and IV only, although the food was prepared and weighed out as usual during the adjustment periods. During Period I, three of the subjects consumed doughnuts and the remaining three ate bread and butter or cookies and butter. During Period II, the first three subjects replaced the doughnuts of the diet for Period I with bread and butter or cookies and butter containing closely similar amounts of fat, protein and carbohydrate, whereas the remaining 3 subjects in like manner substituted an equicaloric equivalent of doughnuts for the bread

TABLE 3

Daily consumption of doughnuts

SUBJECTS	PERIOD I	PERIOD II	PERIOD III	PERIOD IV
A		3		3
D	4		4	
G		5		6
H	3		3	
P		5		4
S	4		6	

and butter and cookies and butter hitherto consumed in Period I. The consumption of doughnuts in a given period ranged from 3 to 6 per day for different individuals (*see* table 3).

The methods of analysis used are given in the Appendix.

RESULTS

The subjects

The experiments extended from June to August, 1932, a period of very hot and frequently humid weather. As may be seen in table 1, there was in all cases a moderate loss of weight. This was undoubtedly due to the failure to consume enough energy to cover the requirements, since five of the subjects engaged in out-door exercise in addition to routine duties. Table 4 contains the data pertaining to the consumption of food. After the conclusion of Period II, opportunity was given to increase the food intake before repeating the experiments in Periods III and IV; five

TABLE 4

Daily consumption of food

PERIOD	DAILY INTAKE		A	D	G	H	P	S
	Grams	Calories						
I	Protein		53.8	82.3	82.6	78.9	72.5	64.3
	Fat		68.0	131.8	118.0	125.1	128.1	116.0
	Carbohydrate		256.9	285.1	304.9	272.4	253.9	264.5
	Calcium		0.439	0.987	0.897	1.214	1.210	0.386
	Phosphorus		0.887	1.669	1.357	1.686	1.455	1.244
		Total	1,906	2,747	2,686	2,616	2,529	2,441
		Protein,%	11.6	12.3	12.6	12.4	11.8	10.8
		Fat,%	33.2	44.6	40.9	44.5	47.1	44.2
		Carbo.,%	55.2	43.1	46.5	43.1	41.1	45.0
II	Protein		51.2	82.7	80.3	79.5	69.3	64.6
	Fat		68.5	133.0	117.6	125.9	128.3	117.3
	Carbohydrate		259.9	282.2	309.1	270.1	258.4	261.6
	Calcium		0.466	0.958	0.936	1.192	1.251	0.357
	Phosphorus		1.133	1.366	1.751	1.456	1.858	0.941
		Total	1,925	2,733	2,710	2,604	2,556	2,427
		Protein,%	10.9	12.4	12.1	12.5	11.1	10.9
		Fat,%	33.1	45.2	40.4	44.9	47.5	44.9
		Carbo.,%	57.0	42.4	47.5	42.6	41.4	44.2
III	Protein		56.8	79.2	87.1	97.6	81.8	71.8
	Fat		78.1	124.2	129.5	140.3	137.5	120.7
	Carbohydrate		293.8	312.3	355.4	246.5	285.0	371.9
	Calcium		0.513	0.729	0.948	1.407	1.520	0.444
	Phosphorus		0.949	1.525	1.468	1.948	1.697	1.525
		Total	2,164	2,772	3,019	2,728	2,783	2,965
		Protein,%	10.8	11.7	11.2	14.7	12.1	9.9
		Fat,%	33.6	41.7	39.9	47.8	45.9	37.9
		Carbo.,%	55.6	46.6	48.9	37.5	42.0	52.2
IV	Protein		56.3	79.6	84.0	98.1	79.3	71.7
	Fat		77.3	125.4	129.2	141.1	137.5	122.8
	Carbohydrate		296.2	309.4	360.7	244.2	288.5	367.6
	Calcium		0.536	0.699	0.996	1.385	1.553	0.400
	Phosphorus		1.179	1.221	1.945	1.718	2.017	1.074
		Total	2,176	2,761	3,048	2,716	2,802	2,943
		Protein,%	10.6	11.8	11.3	14.8	11.6	9.9
		Fat,%	32.5	42.2	39.4	48.3	45.6	38.8
		Carbo.,%	56.9	46.0	49.3	36.9	42.8	51.3

of the subjects augmented the daily food intake at this time. All were in good health at the conclusion of the study; only one expressed a dislike for doughnuts at this time.

The distribution of calories among the various food principles is indicated in table 4. Considering the accepted data in this connection, *viz.*, approximately 14 per cent for protein, 31 for fat and 55 for carbohydrate (3), it is apparent that, with the exception of Subject H in Periods III and IV, the relative number of calories from protein in the present diet tended to be low. On the other hand, with all except Subject A, the proportion of energy from fat was unusually high. This was unavoidable, inasmuch as it was necessary to allow for the substitution of the nutrients of doughnuts which are relatively rich in fat. As a consequence the percentage of the total energy consumed as carbohydrate was unusually low in all cases except Subject A.

Attention should be called here to the intake of calcium and phosphorus of these men. If we accept Sherman's (4) estimate for the minimal requirement of calcium, *i.e.*, 1 gram for 100 grams of protein, it is evident that Subjects A and S were not receiving an adequate allowance of this element at any time during the experiment. Incidentally, neither of these subjects liked milk and they consumed a comparatively small amount of it each day. This failure to drink milk is also reflected in the comparatively low phosphorus intake of these subjects in the non-doughnut periods.

A comparison of the grams of fat, carbohydrate and protein ingested in Period I with those in Period II, and in Period III with those in Period IV, shows the exactness with which the three nutrients in doughnuts were replaced by those in bread and butter or cookies and butter. It was found that either the combination of one slice of bread[1] (30 grams) and 10 grams of butter, or the combination of 2 cookies[2] (24 grams) and 5 grams of butter was closely similar to one doughnut[3] (35 grams) in content of fat, carbohydrate and protein; the interchange of these foods was made on this basis.

Composition of the urine

The analyses of the urine, including average daily volume, pH and titratable acidity, together with total calcium and phosphorus for the period, are presented in table 5. It is apparent that the replacement of

[1] Bond Bread (sliced).
[2] National Biscuit Company "Susan" Cookies.
[3] Ward Baking Company "Mayflower" Doughnut.

the other foods with doughnuts generally augmented the urinary excretion of phosphorus, which was accompanied by an increase in the titratable acidity, though in only three cases was there even a slight decrease in the pH. This shift in composition of the urine was probably due to

TABLE 5

Analyses of urine

PERIOD		A	D	G	H	P	S
I	Average daily volume (cc.)	555	808	649	792	640	618
	Average daily pH	6.4	6.2	5.9	6.3	6.2	6.0
	Average daily tit. acidity	210	404	361	406	329	409
	Total nitrogen (gms.)	50.9	55.0	57.3	54.9	55.3	53.5
	Total calcium (gms.)	0.500	1.501	0.382	1.119	0.700	0.712
	Total phosphorus (gms.)	3.950	6.900	4.950	7.150	5.900	6.050
II	Average daily volume (cc.)	535	727	513	678	581	526
	Average daily pH	6.4	6.2	5.9	6.3	6.4	6.1
	Average daily tit. acidity	186	323	411	296	318	315
	Total nitrogen (gms.)	48.6	60.6	53.7	52.2	47.4	53.8
	Total calcium (gms.)	0.493	1.530	0.314	0.800	0.490	0.672
	Total phosphorus (gms.)	5.000	5.440	6.080	5.440	7.000	4.640
III	Average daily volume (cc.)	553	769	590	825	765	574
	Average daily pH	6.4	6.2	5.9	6.1	6.2	6.2
	Average daily tit. acidity	143	312	369	381	286	294
	Total nitrogen (gms.)	50.2	54.9	59.8	66.2	57.4	46.7
	Total calcium (gms.)	0.541	1.261	0.426	1.104	0.550	0.461
	Total phosphorus (gms.)	3.960	6.360	5.000	7.400	6.200	6.320
IV	Average daily volume (cc.)	570	717	642	895	877	732
	Average daily pH	6.5	6.4	5.9	6.2	6.4	6.4
	Average daily tit. acidity	188	235	394	333	268	228
	Total nitrogen (gms.)	44.6	53.7	55.4	64.7	53.7	51.2
	Total calcium (gms.)	0.526	1.274	0.290	1.116	0.590	0.510
	Total phosphorus (gms.)	4.900	4.600	6.950	6.200	6.950	4.650

the higher content of phosphorus in the doughnuts than in the food replaced.

In view of the uniformity of food intake, it is rather surprising that the values for average daily titratable acidity should have varied so widely. However, as stated above, the subjects with one exception were taking vigorous exercise and losing large amounts of sweat. It has recently been

shown (5) that under such conditions a considerable quantity of free lactic acid is excreted in the sweat, a circumstance which helps to explain the variation in urinary acidity. The loss of water through the skin also explains the low volumes of urine of all of the subjects. It is apparent, even when large numbers of doughnuts are consumed, that there is no change in urine composition beyond the normal range.

Rate of defecation and composition of the feces

The consumption of doughnuts has been alleged to favor constipation. The basal diet employed in the present study was not unusual in its content of indigestible material and hence the record of the number of defecations per period should be an index of the tendency toward constipation. The data summarized in table 6 show the striking uniformity of rate of defecation throughout the experiment, irrespective of whether or not doughnuts constituted part of the ration, and regardless of the number consumed. Furthermore, the proportion of water in the fresh feces indicates that there was no failure of normal alimentary function following the ingestion of the numbers of doughnuts herein used. The variations are no more than might be expected and do not show a tendency in any one direction. One subject (P) noted hardness of the stools and difficulty of defecation in both the basal and experimental periods, although the data (table 6) indicate that definite constipation was not experienced. It appears that even in such an individual with an apparent tendency to difficult elimination, the daily ingestion of 4 and 5 doughnuts over periods of 6 consecutive days did not influence adversely the alimentary function.

Within the sensitivity of the method, reducing carbohydrate could not be demonstrated in the feces nor was undigested starch detected on microscopic examination. The treatment of the feces with acid during drying precludes the presence of disaccharides. The ingestion of doughnuts was marked by an increased content of phosphorus in the feces. There is a preponderance of fecal over urinary calcium which was more marked in those subjects consuming the greater quantities of milk.

Retention of calcium and phosphorus

There is a view current among investigators in biochemistry that as the fat content of the diet is increased, the loss of calcium in the feces as calcium soaps is likewise augmented. The literature has been summarized by Boyd, Crum and Lyman (6). However, these investigators in their own studies with the white rat observed that the retention of calcium

was increased when fat was added to the ration and when calcium was provided as the chloride; with calcium lactate, on the other hand, the retention was slightly less with the added fat. In the present study,

TABLE 6

Analyses of feces

PERIOD		A	D	G	H	P	S
I	No. defecations	6	10	6	8	8	6
	Dry weight	138	150	183	183	148	146
	Per cent water in fresh feces	74	84	81	83	72	76
	Fat (gms.)	18.2	17.2	20.8	26.4	36.6	20.8
	Carbohydrate (gms.)	1.4	1.5	1.8	1.8	1.5	1.5
	Total nitrogen (gms.)	6.76	7.35	11.09	9.46	7.04	7.67
	Total calcium (gms.)	2.208	2.982	3.814	5.607	5.369	1.775
	Total phosphorus (gms.)	2.153	2.040	2.946	3.038	2.886	1.810
II	No. defecations	4	6	6	6	7	6
	Dry weight	132	133	165	149	126	141
	Per cent water in fresh feces	71	86	81	79	70	74
	Fat (gms.)	20.6	21.6	25.3	21.6	35.5	21.6
	Carbohydrate (gms.)	1.3	1.3	1.7	1.5	1.3	1.4
	Total nitrogen (gms.)	6.18	6.72	9.17	8.76	5.51	7.76
	Total calcium (gms.)	2.640	3.192	3.960	4.917	4.788	1.974
	Total phosphorus (gms.)	2.600	1.968	3.350	2.488	3.024	1.607
III	No. defecations	5	7	6	7	8	7
	Dry weight	124	142	205	168	167	170
	Per cent water in fresh feces	69	85	83	82	68	74
	Fat (gms.)	19.1	18.9	23.7	27.2	43.1	24.5
	Carbohydrate (gms.)	1.2	1.4	2.1	1.7	1.7	1.7
	Total nitrogen (gms.)	6.13	7.68	13.49	9.74	7.52	9.66
	Total calcium (gms.)	2.272	2.457	4.075	5.981	7.639	2.139
	Total phosphorus (gms.)	2.083	1.803	2.891	3.041	3.774	2.125
IV	No. defecations	4	6	6	8	6	6
	Dry weight	144	158	209	157	148	174
	Per cent water in fresh feces	71	81	80	80	70	73
	Fat (gms.)	21.5	22.4	22.3	21.9	40.7	25.3
	Carbohydrate (gms.)	1.4	1.6	2.1	1.6	1.5	1.7
	Total nitrogen (gms.)	7.04	8.71	11.50	9.37	5.99	9.57
	Total calcium (gms.)	2.739	2.620	4.435	5.442	7.154	1.914
	Total phosphorus (gms.)	2.347	1.975	3.469	2.842	3.907	1.966

although no attempt was made to limit the calcium intake, it was expected that the high content of fat in the diet might interfere with the retention of this element.

TABLE 7

Balance of calcium and phosphorus

	SUBJECTS					
	A	D	G	H	P	S
Period I						
Calcium:	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*	*gms.*
Intake	2.639	5.923	5.380	7.286	7.259	2.316
Fecal	2.208	2.982	3.814	5.607	5.369	1.775
Urine	0.500	1.501	0.382	1.119	0.700	0.712
Balance	−0.069	+1.440	+1.184	+0.560	+1.190	−0.171
Phosphorus:						
Intake	5.320	10.018	8.143	10.116	8.728	7.466
Fecal	2.153	2.040	2.946	3.038	2.886	1.810
Urine	3.950	6.900	4.950	7.150	5.900	6.050
Balance	−0.783	+1.078	+0.247	−0.072	−0.058	−0.394
Period II						
Calcium:						
Intake	2.793	5.748	5.617	7.152	7.505	2.140
Fecal	2.640	3.192	3.960	4.917	4.788	1.974
Urine	0.493	1.530	0.314	0.800	0.490	0.672
Balance	−0.340	+1.026	+1.343	+1.435	+2.227	−0.506
Phosphorus:						
Intake	6.801	8.197	10.508	8.738	11.145	5.646
Fecal	2.600	1.968	3.350	2.488	3.024	1.607
Urine	5.000	5.440	6.080	5.440	7.000	4.640
Balance	−0.799	+0.789	+1.078	+0.810	+1.121	−0.601
Period III						
Calcium:						
Intake	3.078	4.372	5.687	8.446	9.122	2.662
Fecal	2.272	2.457	4.075	5.981	7.639	2.139
Urine	0.541	1.261	0.426	1.104	0.550	0.461
Balance	+0.265	+0.654	+1.186	+1.361	+0.933	+0.062
Phosphorus:						
Intake	5.695	9.149	8.808	11.687	10.181	9.150
Fecal	2.083	1.803	2.891	3.041	3.774	2.125
Urine	3.960	6.360	5.000	7.400	6.200	6.320
Balance	−0.348	+0.986	+0.917	+1.246	+0.207	+0.705
Period IV						
Calcium:						
Intake	3.213	4.197	5.975	8.312	9.317	2.402
Fecal	2.739	2.620	4.435	5.442	7.154	1.914
Urine	0.526	1.274	0.290	1.116	0.590	0.510
Balance	−0.152	+0.303	+1.250	+1.754	+1.573	−0.022
Phosphorus:						
Intake	7.073	7.328	11.667	10.309	12.104	6.446
Fecal	2.347	1.975	3.469	2.842	3.907	1.966
Urine	4.900	4.600	6.950	6.200	6.950	4.650
Balance	−0.174	+0.753	+1.248	+1.267	+1.247	−0.710

From the data, summarized in table 7, it is seen that Subjects D, G, H and P retained from 0.303 to 2.227 grams for the 6-days' period, despite the relatively large amount of fat in the diet. It might be pointed out that Subject P, who in Periods III and IV consumed next to the largest amount of fat, had the greatest fecal fat output of the six subjects and likewise the largest content of calcium in the feces. Doubtless the positive balance exhibited by this subject, as by Subjects D, G and H also, was made possible by the large amount of milk consumed. In all but one of the periods, Subjects A and S each showed a slight negative calcium balance; this circumstance is correlated with the small quantity of milk ingested by them and calls attention to the comparatively low-calcium content of the rest of the diet.

The influence of doughnuts *per se* on the calcium balance is neither striking nor consistent. The intake of both calcium and phosphorus was augmented somewhat during the doughnut periods. Subjects A, H and S (in 2 periods) showed a slightly lower retention of calcium while doughnuts were eaten, whereas the others and Subject S (in 2 periods) retained more calcium when doughnuts were consumed. It is especially noteworthy that Subjects G and S showed a slightly greater calcium balance when 6 doughnuts per day were consumed, than on the basal ration alone, despite the fact that the fat of the doughnuts accounted for approximately one-half of the total fat consumed. On the basis of these data, it cannot be said that doughnuts, with the composition of those herein employed, exert an adverse influence on the retention of calcium.

Except with Subject H, the ingestion of doughnuts favored the retention of phosphorus. Subjects A (in 4 periods) and S (in 3 periods) showed a loss of phosphorus. Since the basal diet used in this study is probably not grossly unlike that consumed in every-day practice, the balances of calcium and phosphorus observed emphasize again the great importance of milk in the dietary, even of adults.

Apparent digestibility of fat, carbohydrate and protein

To compare the digestibility of the nutrients in doughnuts with their equivalent in the basal diet, the data for Period I should be compared with those for Period II and, similarly, Period III with Period IV. The results bearing on digestibility are summarized in table 8. It is recognized that the method of comparing intake of nutrients with outgo in the feces lacks certain refinements theoretically desirable, but the determination of that portion of the fecal nitrogen contributed by the metabolism irrespective of food (7) was not possible under the conditions of

TABLE 8

Apparent digestibility of protein, fat and carbohydrate

	SUBJECTS					
	A	D	G	H	P	S
Period I						
Carbohydrate:						
Intake (gms.)	1,541.4	1,710.6	1,829.4	1,634.4	1,523.4	1,587.0
Fecal (gms.)	1.4	1.5	1.8	1.8	1.5	1.5
Digestibility (%)	99.0	99.0	99.0	99.0	99.0	99.0
Fat:						
Intake (gms.)	408.2	790.9	708.1	750.7	768.5	696.2
Fecal (gms.)	18.2	17.2	20.8	26.4	36.6	20.8
Digestibility (%)	95.5	97.8	97.1	96.5	95.2	97.1
Protein as nitrogen:						
Intake (gms.)	51.6	79.0	79.3	75.7	69.6	61.7
Fecal (gms.)	6.8	7.4	11.1	9.5	7.0	7.7
Digestibility (%)	86.8	90.6	86.0	87.4	89.9	87.5
Period II						
Carbohydrate:						
Intake (gms.)	1,559.4	1,693.2	1,854.6	1,620.6	1,550.4	1,569.6
Fecal (gms.)	1.3	1.3	1.7	1.5	1.3	1.4
Digestibility (%)	99.0	99.0	99.0	99.0	99.0	99.0
Fat:						
Intake (gms.)	411.1	798.1	705.5	755.2	769.6	703.5
Fecal (gms.)	20.6	21.6	25.3	21.6	35.5	21.6
Digestibility (%)	95.0	97.3	96.4	97.1	95.4	96.9
Protein as nitrogen:						
Intake (gms.)	49.1	79.4	77.0	76.3	66.5	62.0
Fecal (gms.)	6.2	6.7	9.2	8.8	5.5	7.8
Digestibility (%)	87.4	91.6	88.0	88.5	91.9	87.6
Period III						
Carbohydrate:						
Intake (gms.)	1,762.8	1,873.8	2,132.4	1,479.0	1,710.0	2,231.4
Fecal (gms.)	1.2	1.4	2.1	1.7	1.7	1.7
Digestibility (%)	99.0	99.0	99.0	99.0	99.0	99.0
Fat:						
Intake (gms.)	468.4	744.9	776.8	841.8	824.9	724.3
Fecal (gms.)	19.1	18.9	23.7	27.2	43.1	24.5
Digestibility (%)	95.7	97.5	96.9	96.8	94.8	96.6
Protein as nitrogen:						
Intake (gms.)	54.5	76.0	83.6	93.7	78.5	68.9
Fecal (gms.)	6.1	7.7	13.5	9.7	7.5	9.7
Digestibility (%)	88.8	89.9	83.8	89.6	90.4	85.9

TABLE 8—*Concluded*

	SUBJECTS					
	A	D	G	H	P	S
Period IV						
Carbohydrate:						
Intake (gms.)	1,777.2	1,856.4	2,164.2	1,465.2	1,731.0	2,205.6
Fecal (gms.)	1.4	1.6	2.1	1.6	1.5	1.7
Digestibility (%)	99.0	99.0	99.0	99.0	99.0	99.0
Fat:						
Intake (gms.)	463.9	752.2	775.2	846.3	825.0	737.0
Fecal (gms.)	21.5	22.4	22.3	21.9	40.7	25.3
Digestibility (%)	95.4	97.0	97.1	97.4	95.1	96.6
Protein as nitrogen:						
Intake (gms.)	54.0	76.4	80.6	94.2	76.1	68.8
Fecal (gms.)	7.0	8.7	11.5	9.4	6.0	9.6
Digestibility (%)	87.0	88.6	85.7	90.0	92.1	86.0

our study. Hence the data presented in table 8 denote, strictly speaking, apparent digestibility.

The coefficient of digestibility of the usual food carbohydrates is ordinarily high. With diets containing considerable amounts of fruits and vegetables, the digestibility tends to be somewhat lower than when less fiber is present. In the present experiments, the analyses dealt with available carbohydrate only, *i.e.*, sugars and starch. Inasmuch as no such carbohydrates of this type were found in the feces, the digestibility in all periods was excellent.

The coefficient of digestibility of the protein varied somewhat with the individual, the values ranging from 83 to 92, the lower figure pertaining to Subject G whose feces consistently contained more total nitrogen than did those of any other subject. In any individual the greatest difference in coefficient of digestibility between doughnut and control periods was 2, a value scarcely significant in this type of study. Furthermore, the differences were not always in the same direction; higher values occurred as often in the doughnut periods as in the control periods. The conclusion seems warranted, therefore, that the digestibility of the protein of the diet is not altered in degree by substituting some of the nutrients of the basal ration with the same quantity of these food stuffs in the form of doughnuts of the kind used in this investigation.

The values for the digestibility of fat ranged from 94 to 97. The doughnuts used in this study contained 26 per cent of fat, by far the larger part of which is absorbed by the dough during the cooking (8). When 3

doughnuts were consumed daily, the fat of the doughnuts accounted for approximately 35 per cent of the total fat ingested; when 6 doughnuts were eaten, the fat made up approximately 50 per cent of the total daily fat intake. Heated fats have long been looked upon as less readily digestible than unheated fats (9). If, therefore, the heated fat of the doughnuts is less readily digestible, this difficulty should be evident in those experiments in which the fat component of the doughnuts constituted such a large proportion of the total fat intake. It is obvious from the data in table 8 that in no case was there a significant difference between the values for the control period and those of the doughnut periods. Such slight differences as did appear were not always in one direction. Apparently, under the conditions of this study, the consumption of doughnuts, even in large quantities, did not interfere with the digestion of fats.

Since the present investigation indicates that the consumption of doughnuts does not affect adversely either the digestibility of the nutrients of the diet or the retention of calcium and phosphorus, one may ask why there exists the widespread prejudice against this food (10). It should be remembered that in the present study the fat, carbohydrate and protein of the doughnuts *replaced* equivalent quantities of these nutrients in the basal ration. The doughnut is too frequently consumed *in addition to* a meal of ordinary proportions, which fact undoubtedly accounts for a large part of the unpleasant subjective effects commonly attributed to the mere eating of doughnuts. Furthermore, the quality of the ingredients and the care used in cooking are doubtless important factors in the ease of utilization of this food.

SUMMARY

In a study on human subjects the nutrients of an adequate basal ration were replaced by the same amount of nutrients in the form of doughnuts. Under the conditions of this experiment, the apparent digestibility of protein, fat and carbohydrate of the diet was essentially the same, with or without the inclusion of doughnuts. When doughnuts were eaten, the composition of the urine remained within normal limits of variation and the retention of calcium and phosphorus was as favorable as in the control periods. No untoward effects on the health of the subjects were observed when as many as six doughnuts were consumed daily for six consecutive days. Constipation was not experienced in either the control periods, or in those in which doughnuts were consumed.

REFERENCES

(1) STARLING, E. H.: Brit. M. J., 2: 105, 1918.
(2) Bread and Other Bakery Products. Macaroni, Spaghetti, Vermicelli and Noodles. Table 3. Fifteenth Census of the United States Manufacturers: 1929. Industry Series. Bur. Census, U. S. Dept. Comm.
(3) MURLIN, J. R., AND HILDEBRANDT, F. M.: Am. J. Physiol., 49: 531, 1919.
STONE, W. J.: J. A. M. A., 95: 714, 1930.
ROSE, M. S., AND GRAY, C. E.: Relation of Diet to Health and Growth of Children, Child Devel. Mon. No. 2, p. 82, New York: 1930.
(4) SHERMAN, H. C.: J. Biol. Chem., 44: 21, 1920.
(5) FISHBERG, E. H., AND BIERMAN, W.: Ibid., 98: 433, 1932.
(6) BOYD, O. F., CRUM, C. L., AND LYMAN, J. F.: Ibid., 95: 29, 1932.
(7) MITCHELL, H. H.: Ibid., 58: 873, 1924; Bull. Nat. Res. Council, 11: 1, 1926.
(8) MCKEE, M. C.: J. Home Econ., 10: 18, 1918.
DENTON, M. C, WENGEL, E., AND PRITCHETT, L.: Ibid., 12: 111, 1920.
(9) ROSE, M. S.: Foundations of Nutrition, p. 364, New York: The Macmillan Company, 1927.
(10) Saturday Evening Post, p. 15, March 12, 1932.
(11) Official and Tentative Methods of Analysis, Assoc. Official Agr. Chem., 3rd Ed., p. 384, 1930.
(12) Ibid., p. 281.
(13) BENEDICT, S. R.: J. A. M. A., 57: 1193, 1911.
(14) Official and Tentative Methods of Analysis, Assoc. Official Agr. Chem., 3rd Ed., p. 178, 1930.
(15) Ibid., p. 246.
(16) HOLT, L. E., COURTNEY, A. M., AND FALES, H. L.: Am. J. Dis. Child., 17: 39, 1919.
(17) Official and Tentative Methods of Analysis, Assoc. Official Agr. Chem., 3rd Ed., p. 104, 1930.
(18) Ibid., p. 14.

APPENDIX

Drying of Foods and Feces: The following foods were dried to constant weight in a vacuum oven at 98°C.: bread, cereal, doughnut, cookie, lettuce and egg. Meat was dried to constant weight in a vacuum desiccator. Analyses of potato and carrot were carried out on the freshly steamed vegetable, whereas analyses of tomato, orange, banana, milk, jam and mayonnaise were performed on the fresh sample.

Fifty cc. 95 per cent alcohol and 1 cc. sulfuric acid were added to the weighed feces and the samples dried for 48 hours on the steam bath. They were then ground and analyzed.

Nitrogen: Nitrogen was determined in food and feces by the Kjeldahl method.

Available Carbohydrate: The available carbohydrate in bread and potatoes was determined by acid hydrolysis and subsequent measurement of the dextrose by the Allihn gravimetric method (11). The dextrose in jam, ketchup and orange was determined in an alcoholic extract after inversion (12). In breakfast cereal, cookies, carrots, doughnuts, bananas and tomatoes, the reducing sugar in an alcoholic extract was obtained as for jam, and the dextrose yielded by acid hydrolysis of the residue was measured as for bread. The two values were then added. Solu-

ble carbohydrate in feces was determined on a clarified water extract by Benedict's method (13).

Fat: Doughnuts, bread and cookies were analyzed for fat by heating the dried sample with dilute ammonium hydroxide and ethyl alcohol for 2 minutes, and subsequent extraction first with ethyl ether and then with petroleum ether in a Röhrig tube. The extracted fat was dried to constant weight at 100°C. (14). Egg fat was determined by similar extraction after the dried sample had been heated for 15 to 25 minutes with alcohol and hydrochloric acid (15). The fat of meat and breakfast cereal was measured by simple extraction of the dried sample with anhydrous ether for 16 hours. Fecal fat was determined on the dry sample by heating with hydrochloric acid for 20 minutes and subsequent extraction first with ethyl ether and then with petroleum ether. The fat was brought to constant weight at 100°C. (16).

Calcium: Calcium in foods, feces and urine was determined on the ash by titrating the oxalate with permanganate (17).

Phosphorus: A wet combustion of foods, feces and urine was used and the phosphorus determined by weighing as magnesium pyrophosphate (18).

Reaction of Urine: The pH of the urine was determined colorimetrically with brom cresol purple as indicator. Titratable acidity was measured in the usual way with N/10 alkali after adding potassium ovalate.

CALCIUM AND PHOSPHORUS METABOLISM OF NORMAL PRE-SCHOOL CHILDREN: II. SUCCESSIVE BALANCE STUDIES SHOWING THE RANGE OF VARIATION IN CALCIUM AND PHOSPHORUS STORAGE

THELMA PORTER-LEVIN

From the Nutrition Laboratory of the Department of Home Economics of The University of Chicago, Chicago

THE investigation reported in this paper is a study of successive mineral balances determined on normal pre-school children living in their usual home environment and eating their usual diet. The incentive for this analysis was secured primarily from two previous experiments (8) in which an attempt was made to compare the effects of plain and irradiated cereals on the mineral storage levels of children from two to five years old. The results from this earlier work showed marked variations in the quantity of calcium and phosphorus retained per kilogram of body weight in subjects of this age, even when the values were secured from five-day samplings taken in the middle and at the end of forty days on a relatively constant diet. From the experimental procedures used, it seemed that the explanation of such variations, amounting to as much as 25 milligrams per kilo per day in some cases, could be found only in the normal metabolic processes.

An examination of the literature revealed that studies on the mineral metabolism of normal children of pre-school age are not numerous. In those studies in which the discussions indicate that the subjects were normal and the experimental conditions well-controlled (1, 2, 3, 5, 10, 11), a consideration of the quantitative data showed that large variations in the actual amounts of calcium and phosphorus retained were frequently recorded. Usually from 1 to 3 days were used as preliminary periods, during which time it has been assumed that the body adjusted itself to a "steady level" of metabolism on a new dietary regimen. No *continuous* study of the normal mineral metabolism over a considerable period of time without the introduction or removal of some test substance seemed to be available.

The desire to discover the extent and nature of the occurrence of variations in the mineral metabolism of normal children, as well as to determine the period of time for study which would include such fluctuations, prompted this study. It was felt that continuous balances of calcium and phosphorus, taken under normal but well-controlled conditions over a period of 60 days, would give a series of retention rates

which would be a contribution toward the determination of "normal" levels of mineral storage for children from 2 to 6 years old.

EXPERIMENTAL PROCEDURE

The subjects were healthy, in good nutritional condition, and included a boy, O, 2 years and 7 months old, weighing 15 kilograms; a girl, M, 4 years and 8 months old, weighing 18 kilograms; and another girl, J, 5½ years old, weighing 23 kilograms. The children were cared for in home surroundings under the supervision of their mothers. Regular visits to the nursery school physician, with whom the children were acquainted, constituted a pleasant and adequate medical supervision. It is important to note that throughout the course of the experiment the subjects evidenced no unusual disturbance of an emotional or disciplinary nature, and lived with but very little change in environment due to the balance study procedures. Every attempt was made to maintain conditions to which the children were accustomed.

The experimental calendar was made up of a series of successive three-day balance periods, beginning February 2, 1932, and continuing through April 1 of the same year. This totaled 60 days and included 20 three-day periods. The older girl, J, served as a subject for the 20 periods; the boy, O, was studied for 17 of the 20 periods, 15 of which were consecutive. The third child, M, was available for only 6 periods.

The effort to observe the usual and "normal" condition was carried into the planning of the diet, which included only those foods which the children liked. Meals were planned for 3 successive days, and tried out for 2 three-day periods; the intakes were adjusted to the usual appetite and requirement of each subject as nearly as possible. After such quantities were determined, the same three-day meal schedule was repeated successively throughout the study, and, as one of the significant points in the experimental procedure, the intakes were kept constant. The exact daily food and water intakes of each subject are recorded in table 1.

For analytical work, aliquot samples of the weighed food intakes and of all of the excreted urine and feces were made into three-day composites. Food and feces were dried to a constant weight at 80°C. and finely ground before being ashed. The incineration of all materials was accomplished satisfactorily by an overnight heating of weighed portions in an electric furnace at 450°C. Calcium was precipitated as calcium oxalate by the McCrudden method (7), and the quantity determined by titration with N50 potassium permanganate. Phosphorus was determined by the colorimetric method of Fiske and Subbarow (6). All figures

TABLE 1

Daily food intakes of three children during a three-day dietary unit in a sixty-day balance study

FIRST DAY				SECOND DAY				THIRD DAY			
Food	Grams per day			Food	Grams per day			Food	Grams per day		
	O	M	J		O	M	J		O	M	J
Milk, whole	720	720	720	Milk, whole	695	695	695	Milk, whole	720	720	720
Bread	30	57	68	Bread	30	57	68	Bread	30	57	68
Butter	23	23	23	Butter	24	24	24	Butter	24	24	24
Orange juice	100	100	100	Orange juice	100	100	100	Orange juice	100	100	100
Oatmeal porridge	100	100	100	Rice "Pops"	10	10	15	Cream of wheat	100	100	100
Graham crackers	16— 24	16— 24	24— 32	Graham crackers	16— 24	16— 24	24— 32	Graham crackers	16— 24	16— 24	24— 32
Tomato-spaghetti	80	80	170	Potato, baked	40	40	40	Beef stew	75	75	150
Canned apricot fruit	30	80	90	Canned pears fruit	60	100	100	Canned peaches fruit	60	60	90
Canned apricot juice	15	50	45	Canned pears juice	30	50	50	Canned peaches juice	30	30	45
Apple sauce	100	100	150	Spinach	40	20	40	Jello	50	70	100
Bacon, cooked	10	10	15	Beef, lean	40	40	60	Bacon, cooked	10	10	15
Carrots, cooked	35	35	50	Bacon, cooked	10	10	15	Green beans	35	50	50
Sugar	8	8	8	Peas, creamed	60	60	75	Sugar	8	8	8
Vitavose	4		4	Bananas, E. P.	60	60	90	Water, distilled	500	750	300
Water, distilled	500	750	300	Sugar	8	8	8				
				Water, distilled	500	750	300				
Calories	1,404	1,537	1,680		1,349	1,462	1,653		1,321	1,416	1,620

in a balance represent averages of three analyses which agreed within 2 per cent.

The mineral intakes, excretions, and storages were tabulated for statistical treatment. While it was fully recognized that a general and uncritical application of reliability formulas leads to erroneous conclusions, it was felt that, because of the degree of control exercised in the compilation of the data, some measure of the true "representativeness" of the sample was of interest and perhaps was justifiable. The standard deviation of each series was determined, as well as the mean with its probable error, and the coefficient of variation. A frequency distribution of averages of consecutive balances within the range of ±4PE of the mean was determined on the two longer series of retentions in order to make an estimate of the number of three-day balances which would include the observed variations.

The nitrogen balances, which showed that all the children were storing nitrogen throughout the study, were determined by the Kjeldahl method and will be discussed in a later paper.

DISCUSSION

Mineral intakes. The mineral intakes are of especial interest in this study, since the level of intake with its variations has a significant and direct relation to the storage of these minerals. In order to be able to study variations in retentions it was necessary to keep under exact control the conditions of feeding and housing the subjects, and particularly to maintain in a given subject a fixed level of calcium and phosphorus ingestion. The carefully weighed and prepared diet, as well as the good health and coöperation of the subjects, made this possible.

Intakes which were maintained at remarkably constant levels are illustrated by those of subject J. The total calcium intake of this 23 kilogram girl averaged 1.010 ± 0.004 gms. per day, with a range of 0.090 gm. The entire series of twenty intakes had a standard deviation of 26 mgs. and a coefficient of variation of 2.6. Similarly, the total intakes of phosphorus for J averaged 1.050 ± 0.004 gms. per day, with a range of 0.090 gm. The standard deviation was 24 mgs. in this series of intakes, and the coefficient of variation 2. The intakes of calcium and phosphorus for the other two children were nearly the same as those for J (*see* tables 2 and 3), and all were sufficiently constant to warrant a subsequent analysis of variations in retentions.

Mineral excretions. The usual paths of excretion of the minerals calcium and phosphorus are exemplified in the data secured from these

TABLE 2

Average calcium balances in grams per day from successive three-day periods in a sixty-day study on three children

PERIOD	INTAKE		EXCRETION				RETENTION	
	Total	Per kilo	Urine	Feces	Total	Per kilo	Total	Per kilo
Girl J, 5 yrs. 6 mos. old, weighing 22.5–24.2 kg.								
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*
1	0.99	0.044	0.06	0.91	0.97	0.043	0.02	0.001
2	1.05	0.046	0.10	0.91	1.01	0.044	0.04	0.002
3	0.98	0.043	0.05	0.83	0.88	0.038	0.10	0.005
4	1.02	0.044	0.04	0.87	0.91	0.039	0.11	0.005
5	1.00	0.043	0.03	0.83	0.86	0.037	0.14	0.006
6	0.98	0.043	0.03	0.85	0.88	0.038	0.10	0.005
7	0.96	0.041	0.03	0.84	0.87	0.037	0.09	0.004
8	0.96	0.040	0.02	0.89	0.91	0.038	0.05	0.002
9	1.03	0.043	0.03	0.86	0.89	0.037	0.14	0.006
10	1.01	0.043	0.02	0.81	0.83	0.035	0.18	0.008
11	1.03	0.043	0.02	0.80	0.82	0.034	0.21	0.009
12	1.02	0.043	0.03	0.87	0.90	0.038	0.12	0.005
13	1.01	0.042	0.03	0.84	0.87	0.036	0.14	0.006
14	1.00	0.042	0.03	0.92	0.95	0.039	0.05	0.003
15	1.02	0.042	0.04	0.86	0.90	0.037	0.12	0.005
16	1.02	0.043	0.03	0.91	0.94	0.039	0.08	0.004
17	1.02	0.043	0.03	0.83	0.86	0.035	0.16	0.008
18	1.05	0.043	0.03	0.94	0.97	0.040	0.08	0.003
19	1.03	0.043	0.03	0.86	0.89	0.036	0.14	0.007
20	1.03	0.042	0.03	0.81	0.84	0.034	0.19	0.008
Mean...	1.01	0.043	0.04	0.86	0.90	0.038	0.11	0.005
Boy O, 2 yrs. 7 mos. old, weighing 14.6–15.8 kg.								
1	0.96	0.066	0.07	0.66	0.73	0.050	0.23	0.016
2	0.98	0.067	0.10	0.62	0.72	0.049	0.26	0.018
6	0.93	0.065	0.09	0.73	0.82	0.057	0.11	0.008
7	0.97	0.067	0.09	0.83	0.92	0.064	0.05	0.003
8	0.94	0.064	0.10	0.82	0.92	0.063	0.02	0.001
9	0.97	0.067	0.09	0.79	0.88	0.060	0.09	0.007
10	0.97	0.065	0.09	0.68	0.77	0.052	0.20	0.013
11	0.99	0.067	0.09	0.80	0.89	0.060	0.10	0.007
12	0.98	0.065	0.09	0.76	0.85	0.056	0.14	0.009
13	0.97	0.064	0.09	0.81	0.90	0.059	0.07	0.005
14	0.99	0.065	0.08	0.72	0.80	0.052	0.19	0.013
15	0.99	0.064	0.08	0.82	0.90	0.058	0.09	0.006
16	0.97	0.062	0.07	0.78	0.85	0.055	0.12	0.007
17	0.95	0.062	0.08	0.70	0.78	0.051	0.17	0.011
18	0.98	0.062	0.08	0.66	0.74	0.047	0.24	0.015
19	0.96	0.061	0.08	0.77	0.85	0.054	0.11	0.007
20	0.97	0.061	0.07	0.71	0.78	0.049	0.19	0.012
Mean...	0.97	0.064	0.09	0.74	0.83	0.055	0.14	0.009

TABLE 2—*Concluded*

PERIOD	INTAKE		EXCRETION				RETENTION	
	Total	Per kilo	Urine	Feces	Total	Per kilo	Total	Per kilo
Girl M, 4 yrs. 8 mos. old, weighing 17.7 kg.								
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*
1	0.97	0.055	0.10	0.70	0.80	0.045	0.17	0.010
2	1.00	0.056	0.12	0.74	0.86	0.048	0.14	0.008
3	0.94	0.052	0.09	0.72	0.81	0.045	0.13	0.007
4	0.94	0.052	0.11	0.68	0.79	0.044	0.15	0.008
7	0.97	0.055	0.07	0.89	0.96	0.054	0.01	0.001
8	0.96	0.054	0.08	0.73	0.81	0.045	0.15	0.009
Mean...	0.96	0.054	0.10	0.74	0.84	0.047	0.13	0.007

children. Most of the calcium was excreted in the feces, and only a small, relatively constant amount in the urine. On the other hand, a slightly larger portion of the total phosphorus excretion appeared in the urine, with somewhat smaller amounts in the feces. The total excretion of both these minerals, amounting to 87 per cent for calcium and 83 per cent for phosphorus, constituted considerable portions of the intakes. This fact, coupled with the occurrence of variations in excretions more than twice as great as those appearing in the intakes, points to the reason for the fluctuations in the retention levels.

Mineral retentions. It is in the analysis of the findings, on the retention levels of these minerals in the children, that the greatest interest lies. In general it may be stated that the diet in this study allowed for the retention of minerals at a normal level for children of these ages (4, 9). The total calcium retention of all subjects averaged 13 per cent, and the phosphorus retention 17 per cent of the respective intakes of these minerals. On the mixed diet, furnishing approximately one gram each of calcium and phosphorus per day, these two, four, and five-year-old children stored, respectively, 0.14 gm., 0.13 gm., and 0.11 gm. of calcium, and 0.16 gm., 0.13 gm., and 0.14 gm. of phosphorus per day. The average retentions per kilo of body weight, for the subjects in the same order, were 0.009 gm., 0.007 gm., and 0.005 gm. of calcium, and 0.010 gm., 0.007 gm., and 0.006 gm. of phosphorus per day. The average "per kilo" retentions, as represented by the mean of the entire series of 43 balances, were 0.007 gm. of calcium and 0.008 gm. of phosphorus per day. These average retention values, given in tables 2 and 3, show that the levels of storage of both calcium and phosphorus are about the same in all the

TABLE 3

Average phosphorus balances in grams per day from successive three-day periods in a sixty-day study on three children

PERIOD	INTAKE		EXCRETION				RETENTION	
	Total	Per kilo	Urine	Feces	Total	Per kilo	Total	Per kilo
Girl J, 5 yrs. 6 mos. old, weighing 22.5–24.2 kg.								
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*
1	1.01	0.044	0.49	0.49	0.98	0.043	0.03	0.001
2	1.07	0.047	0.49	0.44	0.93	0.041	0.14	0.006
3	1.02	0.045	0.49	0.36	0.85	0.037	0.17	0.008
4	1.06	0.046	0.49	0.37	0.86	0.037	0.20	0.009
5	1.06	0.046	0.46	0.39	0.85	0.037	0.21	0.009
6	1.06	0.046	0.55	0.40	0.95	0.041	0.11	0.005
7	1.03	0.045	0.47	0.45	0.92	0.040	0.11	0.005
8	1.07	0.045	0.52	0.40	0.92	0.039	0.15	0.006
9	1.06	0.045	0.49	0.36	0.85	0.036	0.21	0.009
10	1.00	0.043	0.51	0.35	0.86	0.037	0.14	0.006
11	1.03	0.044	0.56	0.34	0.90	0.038	0.13	0.006
12	1.06	0.045	0.56	0.36	0.92	0.039	0.14	0.006
13	1.01	0.043	0.54	0.34	0.88	0.037	0.13	0.006
14	1.04	0.043	0.58	0.33	0.91	0.038	0.13	0.005
15	1.05	0.044	0.56	0.34	0.90	0.038	0.15	0.006
16	1.06	0.044	0.53	0.40	0.93	0.039	0.13	0.005
17	1.05	0.044	0.57	0.35	0.92	0.039	0.13	0.005
18	1.04	0.043	0.58	0.39	0.97	0.040	0.07	0.003
19	1.05	0.043	0.56	0.34	0.90	0.037	0.15	0.006
20	1.09	0.045	0.53	0.37	0.90	0.037	0.19	0.008
Mean...	1.05	0.045	0.53	0.38	0.91	0.039	0.14	0.006
Boy O, 2 yrs. 7 mos. old, weighing 14.6–15.8 kg.								
1	0.89	0.061	0.43	0.32	0.75	0.051	0.15	0.010
2	0.91	0.061	0.45	0.26	0.71	0.048	0.20	0.013
6	0.91	0.063	0.45	0.32	0.77	0.054	0.13	0.009
7	0.91	0.062	0.41	0.40	0.81	0.056	0.10	0.006
8	0.94	0.064	0.52	0.31	0.83	0.056	0.11	0.008
9	0.91	0.062	0.45	0.31	0.76	0.052	0.15	0.010
10	0.88	0.060	0.43	0.27	0.70	0.048	0.18	0.012
11	0.91	0.061	0.46	0.31	0.77	0.052	0.14	0.009
12	0.93	0.061	0.42	0.30	0.72	0.048	0.21	0.014
13	0.90	0.059	0.46	0.32	0.78	0.051	0.12	0.008
14	0.90	0.059	0.50	0.28	0.78	0.051	0.12	0.008
15	0.93	0.060	0.42	0.31	0.73	0.047	0.20	0.013
16	0.90	0.058	0.41	0.31	0.72	0.046	0.18	0.012
17	0.91	0.058	0.46	0.27	0.73	0.046	0.18	0.012
18	0.90	0.057	0.45	0.26	0.71	0.045	0.18	0.012
19	0.90	0.057	0.46	0.28	0.74	0.047	0.17	0.010
20	0.92	0.058	0.46	0.31	0.77	0.048	0.15	0.010
Mean...	0.91	0.061	0.45	0.30	0.75	0.050	0.16	0.011

TABLE 3—*Concluded*

PERIOD	INTAKE		EXCRETION				RETENTION	
	Total	Per kilo	Urine	Feces	Total	Per kilo	Total	Per kilo
Girl M, 4 yrs. 8 mos. old, weighing 17.7 kg.								
	gm.	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*	*gm.*
1	0.92	0.052	0.54	0.31	0.85	0.048	0.07	0.004
2	0.93	0.052	0.53	0.31	0.84	0.047	0.09	0.005
3	0.93	0.052	0.48	0.29	0.77	0.043	0.16	0.009
4	0.95	0.053	0.53	0.26	0.79	0.044	0.16	0.009
7	0.94	0.053	0.42	0.37	0.79	0.045	0.15	0.008
8	0.93	0.052	0.51	0.28	0.79	0.044	0.14	0.008
Mean...	0.93	0.052	0.50	0.30	0.80	0.045	0.13	0.007

subjects, although whenever there was a difference the phosphorus retention averaged slightly higher than the calcium (2 to 4 per cent).

Perhaps the most pertinent observation on the retentions is their variability in a given subject under controlled conditions. While these variations may be emphasized by the low mean level of retention, they appear to be much greater than would be expected from the controlled experimental regimen. For subjects O, M, and J, respectively, the actual ranges of variation in the total daily storage of calcium were 240 mgs., 160 mgs., and 190 mgs.; in total phosphorus storage the variations were 110 mgs., 90 mgs., and 180 mgs. These fluctuations, per kilo of weight for O, M, and J, respectively, were 17 mgs., 9 mgs., 8 mgs. of calcium, and 8 mgs., 5 mgs., and 8 mgs. of phosphorus. In each instance the phosphorus retention was slightly less variable than the calcium.

As evidence that similar variations in mineral retentions, even when the intake is constant, appear as a normal condition, some analyses of figures in the literature may be permissible. General comparisons, of course, are difficult to make because exactly similar experimental conditions are not found. Nevertheless an examination of the quantitative data of two studies is made. Perhaps the best comparisons with this study can be found in the work of Sherman and Hawley (9). In their report (1922) we find two series of successive balances, each with 5 three-day periods in consecutive order, on given subjects. Interpretations of these data to parallel exactly the figures of the present study show for subject L. M., a twelve-year-old girl, an intake of calcium averaging 1.051 $\pm$ 0.011 gms. per day, with a coefficient of variation of 3.5. On such an intake we find an average retention of 0.207 $\pm$ 0.026 gm. per day, with a coefficient of

variation of 42 and a range of more than 200 mgs. Similarly, on subject A. M., a six-year-old boy, we observe an intake of calcium with a mean level of 0.883 ± 0.003 gm. per day, with a coefficient of variation of only 2. The average retention of calcium was 0.104 ± 0.008 gm. per day, with a coefficient of variation of 29 and a range of 65 mgs. Even wider variations occurred in the phosphorus retentions of the subjects of Sherman and Hawley, since some of the phosphorus balances were negative.

More recently, Boldt, Brahm and Andresen (1) studied the mineral metabolism of two healthy infants on breast and cow's milk by means of successive three-day balances over a period of approximately 90 days. In their investigation we also find marked variations in the retentions of calcium and phosphorus on relatively constant diets. In fact, in only one subject, for one period of 27 days, were there no negative balances. In this subject we find an intake averaging 0.218 ± 0.003 gm. of calcium per day, with a coefficient of variation of 8; on such an intake, variations in retention result in an average storage of 0.057 ± 0.007 gm. per day, a range of 91 mgs., and a coefficient of variation of 58. These two specific comparisons are probably the most exact ones which can be made from the data in the literature, and they indicate that the fluctuations in retentions are of the same order of magnitude as those in the present study.

With these considerations in mind it is pertinent to return to an analysis of the figures in the previous study (8) of the comparison of the effects of plain and irradiated cereals on calcium and phosphorus storage. In that experiment marked changes in the levels of mineral retention, regardless of the kind of cereal used, seemed to make it necessary to reserve the interpretation of the results until further work had been done. At that time no data were available, it was felt, which could be used as a "standard" or measure of normal variations. The findings in the present study, however, seem to offer a series of retentions which may be used in this way and to substantiate the early view that certain fluctuations would normally be observed in the mineral retentions of children on constant diets. A comparison of the amounts of variation in the levels of mineral storage in the two investigations shows that they are similar in range. For example, with respective intakes of calcium of 0.041 gm., 0.042 gm., and 0.053 gm. per kilo per day, and storages of 0.007 gm., 0.10 gm., and 0.007 gm. per kilo per day, the extreme fluctuations of calcium retention were 12 mgs. on plain cereals; 17 mgs. on irradiated cereals; and 17 mgs. on the adequate mixed diet of this last study. The

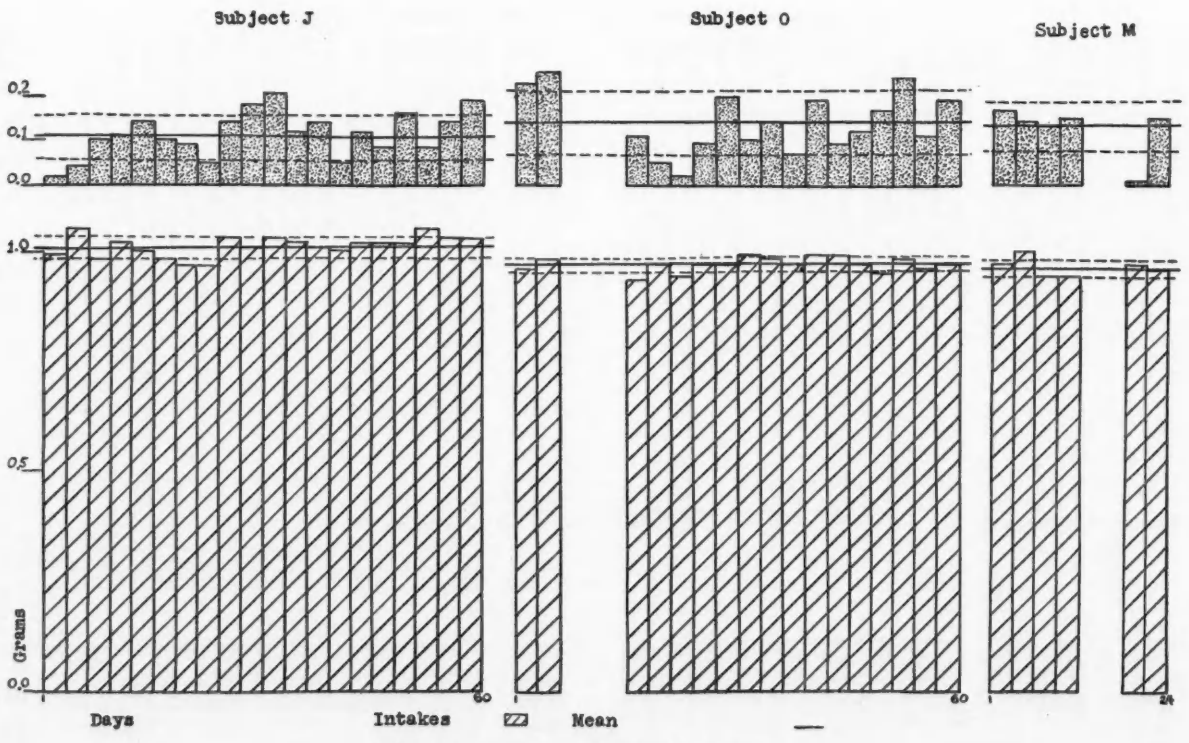

FIG. 1. CALCIUM INTAKES AND RETENTIONS OF THREE CHILDREN

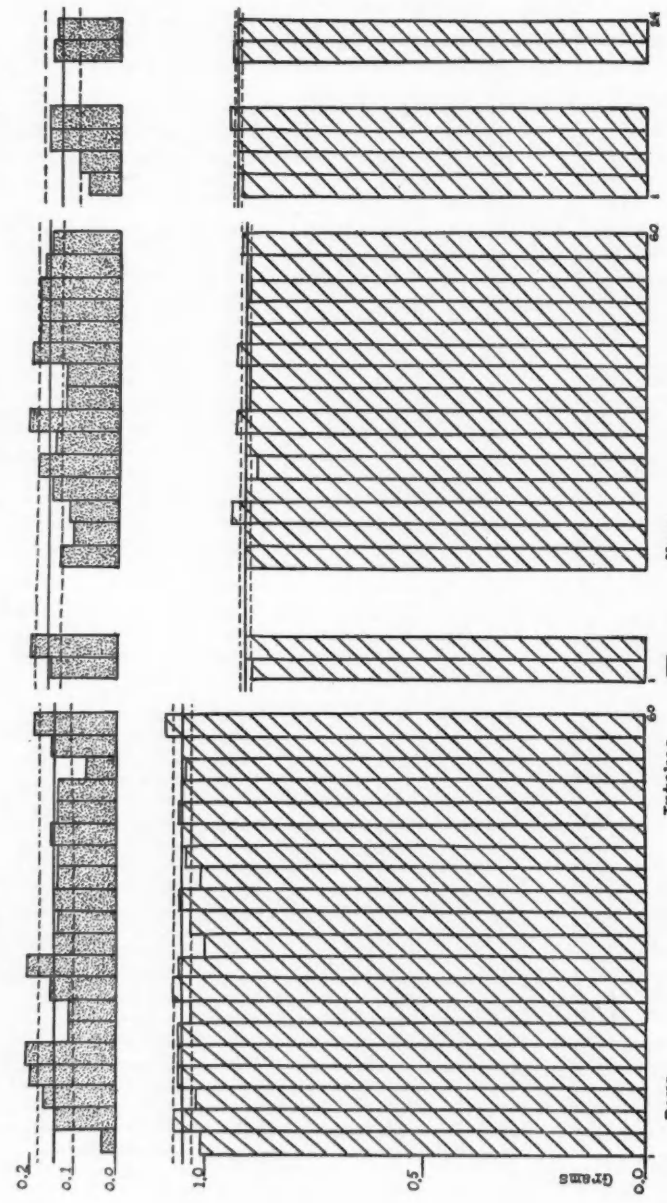

FIG. 2. PHOSPHORUS INTAKES AND RETENTIONS OF THREE CHILDREN

fluctuations in the phosphorus storage paralleled one another in the same manner. The fact that similar ranges of variation in mineral retention appeared in both these studies on pre-school children indicates that they are probably "normal" or expected fluctuations under the conditions of study and technique described.

If wide variations in mineral retentions occur normally in young children on constant diets, this fact is important when considered in the light of its influence on the correct interpretation of mineral storage data. It can be imagined that the selection of random balances as measures of a fixed level of mineral storage in the body may give false values and incorrect interpretations to the effects of a test factor under observation. In reality such chance balances may measure a high or low point within the expected range. Particularly might this be true when there is not due consideration of the changes in the quantities of calcium and phosphorus ingested, or of the starved or saturated condition of body at the time of the test, and when there is not adequate control of the numerous qualitative factors affecting mineral mobilization in the body.

The foregoing consideration of retention variations leads to the question of the length of time for a study which would represent an "adequate sample" of the calcium and phosphorus metabolism of these subjects. A glance at Figures 1 and 2 indicates the somewhat wave-like changes in the levels of storage, and shows that it is not until five to seven balances are included that the complete ranges are covered. As another means of attack on this problem of determining the period of time covering the observed fluctuations, a statistical treatment of the two longer series of retentions was carried out. A frequency distribution of averages of *consecutive* balances within the range of ± 4PE of the mean of each series was made. These calculations revealed that five to seven balances were required before the range of variations was included, the same length of time that a careful inspection of the charts show. It appears, then, that continuous measurement of the mineral metabolism of these children, under this experimental regimen for a period of from fifteen to twenty-one days, was necessary before a complete picture of the changes in the storage of calcium or phosphorus was obtained. This period of time is considerably longer than has commonly been considered necessary for mineral balance studies on children.

SUMMARY

A study of the range of variation in the retention of calcium and phosphorus has been made from successive mineral balances upon three

normal children, two to six years of age, living under controlled home conditions. Forty-three determinations of the complete intake and output of each mineral were made. In every case some calcium and phosphorus were being stored. Twenty consecutive three-day balances were secured on one child; seventeen balances, fifteen of which were consecutive, on another; and six on a third.

1. On a constant mixed diet, furnishing approximately one gram each of calcium and phosphorus per day, the 2, 4, and 5-year-old children stored respectively a daily average of 0.14 gm., 0.13 gm., and 0.11 gm. of calcium, and 0.16 gm., 0.13 gm., and 0.14 gm. of phosphorus. On a "per kilo" basis, these average retentions were, in the same order, 0.009 gm., 0.007 gm., and 0.005 gm. of calcium, and 0.010 gm., 0.007 gm., and 0.006 gm. of phosphorus per day.

2. The retentions of calcium and phosphorus in each series of successive balances secured under controlled conditions showed wide variations from period to period. The range of variation in the total retentions of calcium was 240, 160, and 190 mgs., in the same subjects, respectively, or on a per kilo basis, 17, 9, and 8 mgs. Likewise, the total phosphorus retentions fluctuated over a range of 110, 90, and 180 mgs., or 8, 5, and 8 mgs. per kilo, in the three children.

3. An inspection, as well as statistical treatment of the two longer series of retentions, indicates that it required from five to seven successive balances, or from fifteen to twenty-one consecutive days, to cover the entire range of variation in these retentions.

BIBLIOGRAPHY

(1) Boldt, F., Brahm, C., and Andresen, G.: Langfristige Mineralstoffuntersuchungen an zwei gesunden Säuglingen bei mineralstoffarmer und reicher Kost, Arch. f. Kinderheild, 87: 277–296, 1929.

(2) Burton, H. B.: The influence of cereals upon the retention of calcium and phosphorus in children and adults, J. Biol. Chem. 85: 405, 1929–30.

(3) Chaney, M. S., and Blunt, K.: The effect of orange juice on the calcium, phosphorus, magnesium, and nitrogen retention and urinary organic acids of growing children, J. Biol. Chem. 66: 829, 1925.

(4) Craig, L. P.: An analysis of the literature pertaining to calcium and phosphorus metabolism in children, Unpublished Master's Thesis, Department of Home Economics, University of Chicago, 1931.

(5) Daniels, A. L., Stearns, G., and Hutton, M. K.: Calcium and phosphorus metabolism in artificially fed infants. I. The influence of cod-liver oil and irradiated milk, Am. J. Dis. Child. 37: 296, 1929.

(6) Fiske, C. H., and Subbarow, Y.: The colorimetric determination of phosphorus, J. Biol. Chem. 66: 375, 1925.

(7) McCrudden, F. H.: The determination of calcium in the presence of magnesium and phosphates: The determination of calcium in urine, J. Biol. Chem. 10: 187, 1911–12.

(8) PORTER-LEVIN, T.: The calcium and phosphorus metabolism of normal pre-school children. I. On diets containing plain and irradiated cereals, J. Am. Dietet. A. 8: 482, Mar., 1933.

(9) SHERMAN, H. C., AND HAWLEY, E.: Calcium and phosphorus metabolism in childhood, J. Biol. Chem. 53: 375, 1922.

(10) WANG, C. C., KAUCHER, M., AND FRANK, M.: Metabolism of undernourished children. IV. Calcium metabolism, Am. J. Dis. Child. 35: 856, 1928.

(11) WANG, C. C., KERN, R., AND KAUCHER, M.: The minimum requirement for calcium and phosphorus in children, Am. J. Dis. Child. 39: 768–773, 1930.

(12) WILLARD, A., AND BLUNT, K.: A comparison of evaporated with pasteurized milk as a source of calcium, phosphorus, and nitrogen, J. Biol. Chem., 75: 251, 1927.

FEEDING STUDENTS A LOW COST DIET IN A UNIVERSITY CAFETERIA

FLORENCE QUAST AND HELEN STRAND

College of Home Economics, Syracuse University

SINCE other universities and colleges are considering low cost student feeding, the plan used at Syracuse University may be of interest. The university cafeteria, which is under the direction of the College of Home Economics, started serving low cost diets in September, 1932. The administration plans to give the cafeteria additional space next fall so that a larger number can be served. This year the available seating space is so limited that but a maximum of one hundred and twenty-five can be served. Therefore the privilege of buying the tickets is given only to students who are in need of financial aid in order to remain in college. One exception so far has been made, in coöperation with the health department, in the case of a student who asked the privilege of having the planned dietary.

The plan provides for three meals a day, for six days a week, at a daily cost of fifty-eight cents, or three dollars and fifty cents a week. Only fifty per cent of the fifty-eight cents is available for food because the cafeteria pays all running expenses, including a yearly rent to the university (paid monthly). The percentage cost distribution for the cafeteria, which includes both "ticket" and "regular" patrons, is as follows:

	per cent
Cleaning and laundry supplies	3
Salaries and wages	37
Rent	5
Repairs and replacements	3
Miscellaneous	2
Food	50

Tickets are sold weekly and must be purchased or reserved before Monday morning of the week. All tickets are numbered, are not transferable, and a record is kept of the number and name of the holder. The checker punches the ticket and issues a coded slip which is handed to the cashier. No distinction is made in serving ticket holders and regular patrons; therefore ticket holders know that they are not getting inferior food or left overs, which has a good psychological effect. The servers give them the food planned for each particular meal and ticket holders are allowed no choice; since this was explained to them at the time they purchased their ticket, they have coöperated willingly.

In planning the menus an attractive tray is secured by special atten-

tion to color combination and arrangement. The aim is to serve food of high quality, at the right temperature, with variety in flavor, texture and consistency. Some of the difficulties at the outset were due to students being accustomed to having their heavy meal at noon. Because of the sedentary nature of their classroom work, a light meal at noon seems better suited to their needs. In addition it lightens the serving load during the heavy noon rush. A very few, because of food prejudices, do wish to substitute a more popular food for the one allowed. This is impossible since the diets are calculated and the food cost estimated. Substitutions on the diet are discouraged by charging for the extra food.

Sample menus for a week follow. During each week, a roast or baked meat is included at least once, pie at least once, raw fruit at least twice, dry uncooked cereal once, raw vegetable at least twice.

Breakfast	*Lunch*	*Dinner*
Apple sauce	Lima beans, Creole	Pork sausage
Cream of wheat	Raw carrot and pickle salad	Parsley potatoes
Toast, butter, jam	Bread, butter	Cabbage
Beverage	Pineapple blanc mange	Bread, butter
	Milk	Peach betty
		Beverage
Prunes	Cream of tomato soup	Meat pie
Pettijohn	Macaroni salad	Potatoes
Toast, butter	Bread, butter	Cream spinach
Bacon	Butterscotch pudding	Bread, butter
Beverage	Milk	Chocolate bread pudding
		Milk
Peaches	Welsh rabbit on toast	Meat loaf
Dry cereal	Peas	Potatoes
Muffins, jam, butter	Celery	Carrots
Beverage	Bread, butter	Bread, butter
	Raspberry tapioca	Creamy rice pudding
	Milk	Milk
Figs	Calcutta rice	Chop suey
Oatmeal	Apple and celery salad	Green beans
Toast, butter	Corn bread, butter	Potatoes
Beverage	Blueberry cobbler	Bread, butter
	Milk	Gingerbread
		Milk
Banana	Macaroni and cheese	Baked bluefish
Cream of wheat	Carrots	Potatoes
Toast, jam, butter	Bread, butter	Fresh spinach
Cocoa	Peach shortcake	Bread, butter
	Milk	Cake
		Beverage

Breakfast	*Lunch*	*Dinner*
Whole orange	Mexican scalloped potatoes	Hamburg cakes
Wheat cereal, cooked	Bread, butter	Potatoes
Coffee cake, butter	Cabbage and pineapple salad	Scalloped tomatoes
Beverage	Chocolate floating island	Bread, butter
	Milk	Cocoanut cream pie
		Milk

Standardized recipes are the basis for estimating costs. The number of servings has been checked and rechecked to establish an average cost For a sample of one day's cost chart, refer to Calculated Diet Chart.

Calculated diet chart (for one day)

FOOD TUESDAY, SEPTEMBER 30	AMOUNT	COST	PROT.	FAT	CARBO.	Ca	P	Fe
			grams	*grams*	*grams*	*grams*	*grams*	*grams*
Baked apple	1	$0.010	0.3	0.4	13.9	.007	.012	.00031
Toast whole wheat	2 slices	0.009	5.4	1.0	30.6	.030	.130	.00140
Butter	3 pats	0.012	0.3	25.5	—	.003	.006	.00006
Oatmeal	1 serv.	0.012	2.7	1.2	11.1	.011	.065	.00063
Milk	¼ cup	0.003	1.9	2.4	3.0	.072	.055	.00014
Coffee	1 cup	0.005	0.0	0.0	0.0	.000	.000	.00000
Cream	2 T.	0.008	0.8	6.6	0.8	.026	.020	—
Jam	1 T.	0.011	0.2	—	15.4	.003	.002	.00010
Potato omelet	1 serv.	0.029	6.7	5.2	6.8	.033	.090	.00126
Bacon	½ strip	0.005	0.5	3.2	0.0	.000	.005	.00006
Spinach	1 serv.	0.008	2.1	0.3	2.3	.067	.068	.00660
Bread	4 slices	0.018	10.8	2.0	60.6	.060	.260	.00280
Meat loaf	1 serv.	0.026	17.6	5.3	7.0	.025	.206	.00247
Scalloped potatoes	1 serv.	0.015	6.0	5.8	14.6	.059	.073	.00057
Buttered beets	1 serv.	0.004	1.6	0.1	8.8	.029	.039	.00236
Cherry cobbler	1 serv.	0.013	3.5	12.6	30.2	.016	.032	.00047
Ice-cream	1 serv.	0.040	2.1	15.5	18.3	.072	.056	.00017
Cocoanut cookie	1	0.005	0.7	1.8	7.0	.003	.007	.00007
Milk	1 quart	0.060	31.6	38.4	48.0	1.152	.892	.00232
Totals		$0.293	94.8	127.3	278.4	1.668	2.018	.02179

This form illustrates the calculations for a day. We simplify this process by grouping an entire week and from our weekly totals find the average for each day. This method gives a more accurate account of our daily standards, *i.e.*, one day may be high in iron and the next day low.

We are not satisfied merely to know that the food appeals to the students and comes within our budget; we must also know that it meets their nutritional needs. The group ranges in age from sixteen to twenty-two years and is almost entirely composed of boys, therefore we allow approximately three thousand calories a day. The following calcula-

tions are based on figures in *Nutritive Value of Food.*[1] Sherman's[2] standard of daily needs has been adopted.

	Sherman's standard	*Average daily allowance**
Protein, per cent	15	17
Fat, per cent	35	40
Carbohydrate, per cent	50	43
Calcium, grams	68	1.44
Phosphorus, grams	1.32	1.64
Iron, grams	.015	.0145

* These calculations were made on the week's menus included in this article. The carbohydrate is really higher because extra bread is allowed.

To be certain that all are satisfied, they are allowed to return to the counter for more bread, butter and milk. In order to be sure that each individual is actually eating the food planned, we use various methods of checking.

(a) At noon no bread other than whole wheat is on the menu, and milk is the sole beverage
(b) The reasons for including certain foods in the diets are given to the students by means of typed notes attached to tickets
(c) A record of initial weights is made in September and the request to report any loss. (The only report to date is one case of a nine pound gain.)
(d) Counter observations are made
(e) Individual conferences and personal adjustments are encouraged
(f) Plate waste is checked

This article would not be complete without some comment on the psychology of feeding one hundred and twenty-five boys. On the whole they have shown excellent coöperative spirit and our disciplinary problems have been at a minimum. To be sure, there was the problem with one of the students who kept his hat on even during mealtime and, when criticized, could not decide how to carry both a hat and a tray. Finally, in desperation, not being willing to drop his lunch, he clamped his hat on the back of his head. It was revealing to find a college student who would not eat cooked cereal because "he couldn't face the possibility of finding a lump." Right after him came a boy who "couldn't" eat apple sauce because "it is all mushed up." Tomatoes proved to be the

[1] Waller, D. S.: Nutritive Value of Foods—A Compilation, Geo. Wahr, Ann Arbor, Michigan, 1932.

[2] Sherman, H. C.: Chemistry of Food and Nutrition, New York: The Macmillan Company, 1932, pp. 511–12.

Waterloo of one boy, but when given the privilege of tomato juice, his vitamin C went down readily. The appearance of baked ham invariably draws the comment "who's birthday?" We have found that going half-way and showing a personal interest has developed a friendly atmosphere, which has contributed markedly to the success of our undertaking.

FOOD AND THE MIND

EARL D. BOND, M.D.

Philadelphia

THERE is no good definition for mind but we know that certain of our processes, whether we are asleep or awake, go along on a mental level. Other processes proceed on a physical level. At first glance one might think that food concerned the physical only, because food gives the physical body the materials which it uses and without which it would perish. But at a second glance there appear hundreds of connections between food and the mind, and we see that about food are clustered important mental activities—social, ethical, spiritual. Perhaps dietitians, like doctors, who so much of the time must have their attention focussed on the physical, should have an occasional reminder of another aspect of life.

From the earliest times food symbols have been common in religion, from the fruit of the tree which Eve ate to the vegetarian practices of many present-day sects. Food is a symbol of hospitality and charity; breaking bread with a stranger makes him a friend. Some people, we say, have the milk of human kindness. The details of all this symbolism I shall not go into, but it is clear that food supplies our minds with ideas as it supplies our bodies with nourishment. Perhaps the reason lies in the fact that food has had to do with our earliest emotions—our babyhood happinesses and deprivations. Introduction to people other than ourselves comes through milk, which to the nursing child represents complete satisfaction, while to the child who is being weaned it represents trouble. Introduction to possessing things comes from taking food into mouths, and so the baby tries to devour his toys; the first way to reject things is to spit or vomit them out. Some introductions to a complicated outside world come to the growing child when one thing after another is added to his diet at the same time that something else happens. With a certain kind of breakfast food is associated a thunder storm, or a pleasant sunny day, a smile or a frown. Through food a child is conditioned to the world. Since noises and accidents, and the mother's own reactions to the foods which she tries to get the baby to take, are all every-day affairs, there is almost a certainty that every grown person will have some purely accidental, unreasonable prejudices, fears and attitudes about food.

Such results are evidenced in patients who have mental diseases, simply because such patients are more frank, more sincere, than so-

called normal people. It must be considered, as well, that a patient who is sick for a month with some mental illness may reveal things that have been of importance in his life for many previous normal years and which will continue for many normal years to come.

Mental patients say things like the following: "I ate of the tree of knowledge, now the evil is inside me." "I am sick spiritually, or lost, or condemned, because I ate [this or that]." When a patient says, "I am going to cut my mother up into pieces and devour her," or "I am a wolf and I am going to eat my mother," we take it that he is using a babyish way of thinking in an effort to possess his mother.

Then we find mental patients who simply continue or exaggerate life-long habits. A gallant young military officer was so fussy about his diet that it destroyed his usefulness anywhere; his mother, when he was a baby, had counted every calorie that she or he ate and watched over every mouthful of food that either of them took. Another patient lived on salads and saltines only; another, living on salads and chicken, spent most of his waking hours scrubbing his teeth and gums. A man and a women have had their whole lives, up to 48 and 36 years of age, centered about their gastrointestinal tracts. The woman, sickly and pampered all her life, was never without a digestive disturbance as a child, wanted to be a missionary but was prevented by typhoid fever, of all diseases; now she has nausea which interferes with all of her plans. The man, "morally perfect," has never been free from worry about a chronic intestinal irritation. It seems one might judge from such statements that a choice must be made between moral perfection and a good digestion.

A young man examines his tray carefully for possible glass. He suffers such anxiety lest glass should get into his mouth that eating is more bother than it is worth, and a piece of egg-shell brings on a panic. A girl of 11 was engaged in an endless conflict over food. She wanted to talk of nothing else, but she refused food at regular meals, eating only a little at odd times and by herself. She wanted to bite people dangerously. She refused to carry milk. At the Franklin School at our hospital she was allowed to do as she pleased and she became more sociable, more normal in behavior, but almost emaciated. Her parents removed her to a hospital where she was disciplined and fed by tube when she refused to eat, and where she gained 30 pounds, but grew worse in behavior. Here is a desperate conflict with no solution; it is strange that there has to be a choice between good nourishment or good behavior.

Now it is not a far step from what mental patients think about food

to what most sensitive people think about it. If there is anything about which people are more capricious, more fussy, irritable, and unreasonable than they are about their own diets, I do not know of it. To some men a meal can give the same pleasure that music gives; it is a relief from fatigue and worry. But it must be the right kind of meal. To some women, especially in these days of weight reducing, food is a disgusting or torturing thing. Around the family table are fought out the most bitter personal battles which often center about what should be eaten, and about how one should eat. The children have found no better means of occupying the limelight in the center of the stage than to fuss about food and especially to refuse it. To many persons food values have become the greatest things in life as they devote themselves to food fads, to food cures, almost to food religions. Unnecessary diets are becoming a part of medicine; a physician can keep his patient satisfied by diet even more than by medication.

This modern, unscientific and misguided interest in calories, vitamins, carbohydrates, oranges and so on, does its share to produce the gastric neuroses and the situation in medical practice that for every patient for whom a diet is necessary for physical reasons, there are ten for whom diets must be considered for mental reasons. These neuroses confuse medical issues. I have recently seen a patient who was operated upon for gastric ulcer because she had been disappointed in love. Dr. Cannon records the case of a wife who had no gastric juice on the morning after her husband got drunk. There are men who cannot digest their lunches if they go back to their desks and are reminded of all their business troubles. There are persons who seem to want personally to conduct and manage the food they have eaten through all its processes toward assimilation, refusing to delegate any responsibility to Nature, training themselves to recognize every little wiggle of the alimentary canal, the pancreas and the gall bladder.

As I listen to people who tell of the tremendous changes in digestion which have been produced by slight changes in the carefully prepared food sent to a so-called delicate stomach, I think of a lady who swallowed a tooth brush. The handle was hard, dense bone; probably it had seasoned for years before manufacture. This lady's delicate stomach took hold of the bone handle and, as X-rays showed plainly, digested it with ease, meanwhile sending the brush parts where they would do least harm.

In home life the difficult food situation is met to some extent by individual cooking, so that each member of a family has his own special

dishes. But then we gather hundreds of these individualists into school and colleges, or into hospitals where they are sick, and expect a dietitian to provide meals that will suit all of them, at all times, no matter what different emotional backgrounds lie behind them.

It is natural for a dietitian and an administrator to go from one extreme to the other in this situation. First she will try to meet every demand and so be rid of all the bothersome and irritating complaints; in doing this costs increase and there are still complaints. Then she may go in the opposite way, fall back upon a low cost standard service and harden herself to complaints, believing that since they are coming, anyhow, money might as well be saved for other hospital uses.

Of course the dietitian's job in a hospital is made more difficult by the tendency for sick people to regress—to become more childish, babyish, or emotional—and by the mental changes which accompany the ups and downs of bodily conditions. Adding these traits to those I have mentioned before, the dietitian has an explanation of why the same food will be praised by one patient and condemned by another, or praised and condemned at different times by the same patient. Often the real object of such praise and blame is not the hospital, not the dietitian, but some long distant event which sweeps into the present to control it in the weakened state of the personality. Much of such criticism has nothing to do with the immediate situation, and it is a help to be aware of this.

Every patient wants some decidedly individual attention. A friend of mine had it made plain to her that she was just a case. A few hours after tonsillectomy in a hospital she was served a full supper with veal cutlets. That tray said, "no one here in this hospital cares about your particular sufferings; no one is going to bother about you." And this patient is still trying to get even.

What is the answer? More study of the mind and its devious ways is needed by every doctor, nurse and dietitian. The dietitian should be a practical psychiatrist who will realize that every tray to a patient, every dish before a student or nurse, is laden not only with proteins and vitamins, but with hopes and fears, and happy and unhappy memories.

EDITORIAL

The 1933 Chicago Convention

With stimulating recollections of the 1932 New York meeting, probably the most successful in the history of the American Dietetic Association, members and friends of the Association are making plans for the Chicago meeting. Early progress in program plans is being made under the direction of Faith McAuley, program chairman. Progressive and active affiliated local and state associations assure the fine attention to the details of convention organization so evidenced at the New York meeting.

This promises to be an auspicious year for a national meeting in Chicago. It is the year when the city presents a dramatization of the progress made in all fields of human endeavor during the past one hundred years, to be exemplified in the Century of Progress, Chicago's 1933 world's fair. One hundred years ago this amazing city was a frontier village of 350 inhabitants. In the comparatively short space of ten decades, as the world counts time, it has grown to be the giant metropolis of the Middle West with over four million inhabitants. The world of tomorrow, today and yesterday will be on parade at the Exposition. It will be "an encyclopedia come to life with thrilling chapters told by means of animated displays." Of particular interest to dietitians will be the graphic portrayal of one hundred years of progress in living conditions, in the food world, and in new weapons for fighting disease as exemplified by the past century's progress in the science of medicine.

Attractions of historic and educational interest will be assembled, from the golden pavilion of Jehol to the Lincoln group of buildings and the reproduction of old Fort Dearborn. A fascinating "Enchanted Island" will interest children and their friends. All railroad fares will be surprisingly low. The convention will be held October 9 to 13 in the particularly pleasant atmosphere of the Palmer House, and all indications point toward another annual meeting in keeping with the progressive spirit of our national organization.

A Field for the "Non-active" Dietitian

Widespread poverty has given a new impetus to community health and welfare. In many of the smaller communities no attempts had been made toward health education, except in a very minor way through school nurses. Rather suddenly, numbers of people faced unemployment and their families were in want. This made these smaller towns

and cities realize forcibly the need for budgeting funds to be used in carrying on even the most meagre welfare programs.

In some instances groups of public-spirited women had been promoting obscure independent activities, such as the hiring of one nurse who worked out a combination public health nursing and social service plan. This service met the needs of only a very small number of people and in some cases was maintained only for children in the pre-school age group. Increased demands for help with nutrition and family health problems brought publicity to the existing small private groups and created a general movement toward the establishment of real community organizations.

Public health nursing associations were frequently the forms of organization selected as those best fitted to meet the diversified needs of the people. These associations could provide the services of nurses for people of all ages, both with bedside care and health instruction. When such an enterprise was planned, backed by the public, nursing care could be given whether or not the small hourly fee could be collected.

Nutrition workers can be used successfully in such groups, according to Mrs. Thelma Tubbs Currier, either in a consulting capacity to the public health nurses, or as active workers in the larger public health groups that have been in existence in the communities for years. Health and welfare services which are organized during the stress of these trying times undoubtedly will maintain an important position in the lives of the people. These newly formed groups should be aided by women trained in nutrition who have retired from an active professional career and who have time to give to public movements. Their services can do a great deal to establish permanent community health education.

CURRENT COMMENT

Standardization of Routine Hospital Diets

A Committee Report[1]

It has been the purpose of this committee to compile material which might further the development of uniformity in routine hospital diets. During the first year of its activity the committee carried out a survey of the nomenclature and construction of these diets as used in Grade A

[1]This study was conducted under the direction of Grace Bulman, Margery Ardrey and Dorothy Waller as a part of the Diet Therapy Section program of the American Dietetic Association for 1930–32.

hospitals in different part of the United States. During the second year an attempt was made to amplify this by a definition of the purpose of the diets, and to characterize and illustrate the types of food included.

Sixty-five hospitals furnished copies of their diet lists, which showed a wide variation in nomenclature with the terms "liquid," "soft," "light" and "regular" predominating. Thirty-six hospitals listed two kinds of liquid diets, usually distinguishing between a restricted type of diet, permitting clear liquids only, and a more complete diet including milk and milk beverages. One hospital recorded three kinds of liquid diets, listing a "non-acid" in addition to a "clear" and a "full" liquid, while several others suggested that no acids be included in the restricted type of liquid diet. There were twenty variations in title where two kinds of liquid were being used, with the combination, "restricted liquid" and "liquid" appearing most frequently.

Eighteen hospitals used more than one kind of soft diet, the titles "semi-soft" and "soft" being most used. In the majority of these hospitals, a distinction between the two types of soft diet was made chiefly on the basis of whether puréed vegetables and the simplest forms of meats were given. The restricted type of soft diet included all foods permitted on the liquid diet, plus fine grain cereals, milk toast, mild fruits (puréed), soft-cooked eggs, and milk puddings. This diet served as a stepping stone from the usual liquid diet to the soft diet which included potatoes, puréed vegetables, minced chicken, and simple desserts.

Of all the groups, the light diet showed the least variation in nomenclature, listing only ten titles, with fifty hospitals using the term "light," although several of the so-called "light diets" included all the items usually found on a normal diet menu. On the majority of the hospital lists, the light diet contained all the items served on the liquid and soft, plus mild vegetables (not puréed), cooked and citrus fruits, additional meats such as lamb chops, bacon and sweetbreads, and plain cakes and puddings.

Most of the fourteen titles listed for the normal diet were variations of the terms "regular," "general," "full," and "house," with "regular" and "general" appearing most often. On this diet, a few hospitals included all foods for a normal diet without reservation, but the majority took exception to fried and highly-seasoned foods, gas-forming vegetables, meats, such as fresh pork and corned beef, and rich cake and pastry.

Although the information obtained from the hospitals indicated that in many it was customary to order liquid, soft, and light diets more or less routinely as the patient's condition improved, several clear-cut reasons for the prescription of the different diets were obtained.

A digest of these opinions appears under the headings of the various diets as "definition." Incorporated also are modifications in the original reports arrived at in discussion following their presentation to the Association. An instance of this is the degree of restriction in the "general diet." Obviously this will vary with the type of institution in which it is used. A hospital with a high percentage of convalescent bone and joint surgical cases will limit its "general diet" much less than one in which the majority of the patients are either straight medical or surgical cases with a minimum post-operative period before discharge. It would be impossible to outline a series of standard or routine hospital diets which would fit exactly the needs of every institution. There will always be the necessity for individualization in adapting the diet to the particular needs of the institution and individual. It is our conviction that this is as true in the case of "soft diet" as in any therapeutic regimen. Our aim has been:

1. To describe the principles underlying the construction of routine hospital diets, with particular reference to the diet as it meets:
   a. The caloric, protein, mineral, and vitamin requirements of the patient
   b. The residue tolerance of the patient
   c. The digestibility of the food
2. To set up a suggestive series of diets which conforms to the principles outlined and which is consistent with current practice.

The diets in which the widest variation was encountered were the "soft" and "general" diets, and those as outlined below represent, in foods included, a conservative majority opinion rather than the maximum of restriction.

Restricted Liquid Diet

A. Definition—A diet which gives, for a very short period of time, limited non-gas-forming nourishment to patients with a serious impairment of the functions of digestion. This diet should be given at frequent intervals to relieve thirst, supply the tissues with fluid, aid the eructation of gas, and furnish a small amount of carbohydrate to counteract the fasting ketosis.

B. Types of Foods Included: Only those clear, non-gas-forming, non-residue, sub-acid liquids, containing water, carbohydrate, and a small amount of protein in their most soluble and easily digested forms.

C. Food Articles: Fat-free broth; tea; gingerale; bland fruit juices (pear, white cherry, and peach).

Full Liquid Diet

A. Definition—A diet to increase the nutritive value of the *restricted liquid diet*, and to supply additional variety with a minimum of digestive activity. Though

usually given for a limited period of time and low caloric, it may be made fully adequate for maintenance requirements.

B. Types of Foods Included: Those comprising the *restricted liquid*, and all other foods which are liquid at room and body temperature. The patient is thus supplied with complete protein and carbohydrate foods, interesting in color and flavor, which supplement the mineral and vitamin content of the diet, and some of the emulsified and easily digested fats as well.

C. Food Articles: Cereal gruels; fruit juices; strained cream soups; milk and cream beverages (malted milks, egg nog, and cocoa); butter; albuminized beverages; and desserts (plain gelatines, soft custards, ice cream, sherbet, ices and junket).

Soft Diet

A. Definition—The gradual transition from the *full liquid* to the *light diet*. Though chiefly used for a limited period of time, it may be made adequate for maintenance, or to supply increased energy or protein. In addition to *all* liquid foods, the *soft diet* includes easily digested solid foods, finely-divided and thoroughly cooked, requiring little effort to eat, and containing the least possible amount of residue.

B. Types of Foods Included: Liquid regimen plus protein foods low in connective tissue and closely combined fat, in sufficient amounts to satisfy normal requirements; thoroughly cooked residue-free cereals, plus low residue carbohydrate foods to reinforce the caloric, mineral, and vitamin value of the diet.

C. Food Articles: Fine grain cereals cooked and packaged (rice, macaroni, spaghetti, noodles, Cream of Wheat, farina, well cooked oatmeal); crackers and toasted white bread; vegetables (potatoes, mashed, baked, creamed, and any puréed vegetable); fruits, soft-cooked, free from skin (canned peaches, pears, apricots, baked or stewed apples [without skin], baked bananas, grapefruit and orange pulp, and fruit jellies); meats (minced, stewed, or roast chicken; minced, baked, or steamed fish, oysters, sweetbreads, scraped beef); soft cooked eggs; cottage cheese; all milk and cream beverages; desserts (milk and egg, gelatine, farinaceous puddings, sponge and angel cake, and soft cooked fruits, *see* above).

Light Diet

A. Definition—A sequence to the *soft diet* as a preparation for the *general diet*. It is moderately restricted in residue, and excludes those foods requiring an extremely long time for digestion. The diet is given at normal meal periods, and easily meets the maintenance requirements.

B. Types of Foods Included: In addition to *soft diet*, are all solid foods which offer little resistance to breaking down by the digestive juices. This allows a more liberal use of protein (with the exception of foods containing much connective tissue), and the more easily digested cooked and raw fruits and vegetables, thus supplying sufficient residue to promote peristalsis.

C. Foods Included in Addition to *Soft Diet:* All cooked as well as prepared cereals; Graham bread; vegetables (cooked and raw *except* the cabbage family, onions, corn, dried beans, cucumbers, radishes); all fruits; all soups; meats (bacon, broiled lamb chops, poultry, fish, sweetbreads, scraped beef, brains); all milk

and cream beverages; eggs (any way but fried); cheese (American, cream, cottage); desserts (those on *soft diet* plus all simple desserts, and plain cookies and cakes); and miscellaneous items (mayonnaise, olives).

General Diet

A. Definition—The complete fulfillment of normal nutritive requirement of the ambulatory patient with no restriction of food articles.

The Low-Salt Dietary[1]

The low-salt dietary, frequently misnamed the "salt-free diet," has found widespread use in recent years in both empirical and rational medical therapeutics. Many have assumed that the chloride was the important part of the salt to omit from the diet, simply because of the greater ease of determining this ion of the salt, rather than from any cause and effect basis. Nearly three decades ago and more recently,[2,3] the "salt-free" diet has been used in the treatment of hypertension; O'Hare,[4] however, is not convinced of its efficacy in this condition. Where a more rational application of the low-salt dietary is indicated; namely, in renal and cardiac diseases associated with edema, certain complications of pregnancy accompanied by edema, diabetes insipidus, and epilepsy, it is the restriction of the sodium and only secondarily, if at all, of chloride which is important. When water is retained, or lost as extracellular fluid (edema), the base simultaneously retained or lost is chiefly sodium.[5,6] In cardiac edema,[6,9] nutritional edema,[10] and nephritic edema[6,7,8] sodium is the important item. Sodium bicarbonate is just as deleterious as sodium chloride in aiding edema formation in certain pregnancy toxemias. In diabetes insipidus both the fluid intake and comfort of the patient are improved by a reduction in the intake of sodium salts and less pituitary extract is necessary to control the symptoms.[11] The favorable effects of

[1] Summary of a paper read by Eaton M. Mackay, M.D., of the Scripps Metabolic Clinic, before the California State Dietetic Association.

[2] Allen F. M.: J. A. M. A., 47: 652, 1920.

[3] Allen, F. M., and Sherrill, J. W.: J. Metab. Research, 2: 429, 1922.

[4] O'Hare, J. P., and Walker, W. G.: Arch. Int. Med., 32: 283, 1923.

[5] Gamble, J. L., Ross, S. G., and Tisdall, F. F.: J. Biol. Chem., 57: 633, 1923.

[6] Peters, J. P., and Van Slyke, D. D.: Quantitative Clinical Chemistry, Baltimore: Williams and Wilkins, 1931.

[7] Albright, F., and Bauer, W.: J. Clin. Invest., 7: 465, 1929.

[8] Loeb, R. F., Atchley, D. W., Richards, D. W., Jr., Benedict, E. M. and Driscoll, M. E.: J. Clin. Invest., 11: 621, 1932.

[9] Personal observations.

[10] Weech, A. A. and Ling, S. M.: J. Clin. Invest., 10: 869, 1931.

[11] Personal communication from Dr. F. M. Smith of this institution.

a low-salt diet in epilepsy are definitely known to be due to the low sodium intake.[12,13] With the knowledge that the effects of the low-salt dietary in a number of conditions are due to a reduced sodium intake, one may consider certain points often overlooked in practical dietetics.

Many dietetic departments scrupulously prepare low-salt diets with regard to added sodium chloride, or that originally present in the foodstuffs, and then vitiate their efforts by including quantities of baking soda or baking powder in the diets. Such use of sodium bicarbonate must be avoided as consistently as sodium chloride. A low-salt diet is often difficult to initiate and even more difficult to maintain. Two commercial salt substitutes have appeared on the market. One entitled "Eka Salt," marketed by the Sharp & Dohme pharmaceutical house, is described as essentially sodium malate, and on analysis is found to contain 22.3 per cent sodium. Sodium chloride contains 39.0 per cent sodium, so that assuming equal saltiness it would reduce the amount of sodium in the diet only slightly. Although sodium malate is an alkaline salt in metabolism and as such is known to be retained less easily by the body than the neutral sodium chloride, it is nevertheless sodium in its behavior and should have no place in the low-salt dietary. A more recent salt substitute is "Curtasal," a product of the Winthrop Chemical Company, and described as consisting of the calcium, magnesium and sodium salts of aliphatic carbonic and oxycarbonic acids; an analysis showed 32.9 per cent sodium. The circular recommends, as a general rule, about twice the amount of "Curtasal" as common table salt for cooking and baking. Since common salt contains 39.0 per cent sodium, replacing it with "Curtasal" would mean a decided increase in the amount of sodium in the diet.

Naturally foods containing the lowest amount of sodium should comprise the bulk of the low-salt diet, yet food analyses are often based upon the chloride content of the dietary ingredient in the absence of more definite information. Fortunately chloride and sodium often parallel one another in various foods and the sodium chloride figure as calculated may be accurate enough for most uses; this is not necessarily so, however, and there is definite need for more information regarding the sodium content of many foodstuffs.

The preparation of a low-salt diet limits the use of milk and cheese, the chief sources of calcium in the diet. Furthermore the absorption of whatever calcium there is in the food may be sub-normal when the

[12] McQuarrie, I., Manchester, R. C. and Husted, C.: Am. J. Dis. Child., 43: 1519, 1932.
[13] Unpublished experiments of Dr. A. M. Butler, The Children's Hospital, Boston.

amount of salt in the diet is reduced. There is the probability then, particularly in children, that a low-salt diet will mean an insufficient calcium intake, and a calcium supplement, such as calcium acid phosphate, calcium lactate or gluconate, becomes desirable. In addition, other possible deficiencies must be guarded against. A satisfactory low-sodium diet, continued for a long period of time, when kept palatable and otherwise complete, is frequently a severe test of dietetic skill and patience.

Developments in the Public Health Service

Studies on the control of pellagra are being continuously emphasized, according to the 1932 report of the Surgeon General. The death rate from this disease in 1931 was 4.8 per 100,000 population, as compared with 5.9 in 1930, and 6.2 in 1929. Since an increase was feared, due to economic conditions, many communities were provided with pellagra-preventive foods. From figures available, it appeared that the incidence was less during the first six months of 1932 than for the corresponding period in 1931. Special studies are being conducted on the pellagra-preventive potency of easily available foodstuffs. In September, 1931, a paper on the history of pellagra in the United States was published in the Public Health Reports.

Pellagra incidence was surveyed among the soft coal miners of southeastern Kentucky and the hard coal miners of northeastern Pennsylvania. The former's diet was characteristic of the rural south, while the latter's was dominated by fresh meats, milk and vegetables. Pellagra was prevalent among the former and very rare among the latter.

Analyses of canned corned beef, evaporated milk, turnip greens and collard showed satisfactory pellagra-preventive value. Canned spinach and mustard greens were less satisfactory. Irish potatoes showed little or no protective value. Tests of navy beans, red kidney beans, canned chicken, buckwheat flour, and peanut meal are still in progress.

According to the Public Health Reports for January 20, 1933, dried baker's yeast is a good source of the pellagra-preventive factor, and its potency is retained after heating in the steam autoclave at 15 pounds pressure for $7\frac{1}{2}$ hours. Canned flaked haddock contains the pellagra-preventive factor, but in an amount so small that a relatively large proportion is required adequately to supplement an otherwise pellagra-producing diet. Canned green peas supply the pellagra-preventive factor and may be found a highly practical and convenient source of this essential in the pellagrous sections during the spring months when pellagra-preventive supplements are scarcest.

The results of the studies on fatty degeneration of the liver in dogs indicate that the condition is based on a dietary deficiency. A special report was also made on the toxicity of several amino acids.

A study of children of psychotic parents brought out the significant facts that among psychotic patients there is a low marriage rate, a high sterility rate, and a tendency to small families. The children of psychotic parents, however, showed less frequent deviations from an accepted "normal behavior pattern" than did the group of unselected children from a rather better-than-average public school.

Milk investigations conducted by the Public Health Service in 1931 concerned bactericidal treatment of containers and equipment in milk production. These studies seem to indicate clearly the importance of receiving milk cold, and of placing it immediately in a refrigerator which is kept at a temperature of not less than 50°F.

In studying cleaning and disinfection of udders and hands it was found that proper washing with clean water and proper drying with clean cloths brought about a 78 per cent reduction in the surface bacteria on the udder. Washing the udder with a chlorine solution, between 50 and 100 p.p.m., brought about a 98 per cent reduction of the udder surface organisms.

It is believed that careful study justifies the conclusion that the growth-promoting capacity of heated milk, plus the supplementary diet received by the average American child of from 10 months to 6 years of age, is not measurably less than the growth-promoting capacity of raw milk plus the same supplementary diet.

In answer to many inquiries, the Public Health Service reviewed the extent of pasteurization and tuberculin testing in American cities. From questionnaire returns it was concluded that the percentage of milk pasteurized, in American cities of 10,000 or more population, increased from 81.8 per cent in 1927 to 87.5 per cent in 1931. The percentage of milk from tuberculin-tested cows increased from 68.1 per cent in 1928 to 88.0 per cent in 1931. The percentage of milk which was either pasteurized or from tested cows, increased from 99.1 per cent in 1927 to 99.83 per cent in 1931. The percentage of milk which was both pasteurized and from tuberculin-tested cows, increased from 50.8 per cent in 1927 to 74.5 per cent in 1931.

During the year 1931 twenty-one outbreaks of milk-borne disease were reported to the Office of Milk Investigations. Eight outbreaks of similarly caused septic sore throat were reported; one each of paratyphoid fever, scarlet fever, diphtheria, dysentery, and gastroenteritis.

There are 29 dietitians in the service of 25 Public Health Service hospitals, eight of whom were appointed during the year 1932. The report states that "The practice of requiring the chief nurse in the smaller hospitals to perform the duties of dietitian as well as those of chief nurse continues to prove satisfactory and gives a valuable experience to the nurse. Possibly two additional dietitians will be needed to staff the Seattle hospital."

BOOK REVIEWS

Manual of Diets of the Montefiore Hospital, Gun Hill Road, New York City. Pp. 46. Price $1.00.

The special therapeutic diets described in the manual were prepared under the auspices of the Medical Board of the hospital by its Committee on Dietetics, made up of Drs. John Kantor, Chairman, B. S. Oppenheimer, Sol Biloon, and E. M. Bluestone, in coöperation with Lenna Cooper, supervising dietitian. At the time of printing, this hospital was providing the largest number of special diets for ward patients of any hospital in Greater New York.

The general, or regular house diet was the basis of about ten of the diets which were supplied from the main kitchen, with supplements from this kitchen or the diet kitchen. The balance of the diets, about thirty in all, came from the diet kitchen. All directions for preparation and handling of these diets are presented in a clear and accurate way, and the manual should prove of real interest and value to anyone engaged in the diet therapy, either in the hospital or clinic. Montefiore Hospital has been recognized for years as a hospital serving a wide variety of cases. This fact alone makes the manual of value.

EMMA FEENEY

Manual for Food Preparation Study. By Florence King, Ph.D., Bureau of Home Economics. New York: John Wiley and Sons, 1933, pp. 111. Price $1.50.

This practical and thought-provoking manual for food preparation study deserves hearty recommendation for use in schools where cookery is taught in the way it should be—as a real science.

The essentials in cookery are presented by a series of carefully prepared tests or experiments, involving variations in time, temperature, proportions, etc., and including simple chemical and physical tests. The manual is so arranged that it does away with the ordinary cookery notebook. There are spaces for the study to record observations and the book is made up in loose leaf form so that a summary may be inserted by the student at the end of each problem. The questions at the close of each lesson are designed to help the student think the problem through and apply it. The manual should always be supplemented, as the author suggests, with tests on food economics, food history, food handling and nutrition, in order to round out the course. This is an interesting and worthwhile manual.

EMMA FEENEY

Savannah Cook Book. By Harriet Ross Colquitt. New York: Farrar and Rinehart, 1933, pp. 186. Price $2.00.

This volume is a welcome addition to the books on regional cooking. It is arranged to appeal to the experienced cook, rather than the novice, and offers a collection of famous recipes from a section noted for its good cookery. Savannah soups, hot breads, sea foods, rice and hominy dishes, and desserts are well represented.

We owe a debt of gratitude to the author's patience in tracking down the famous recipes of cooks who cook "by ear," and to her discrimination in translating a speck of this and a dash of that into measurable terms. The charm of the book is enhanced, however, by occasional directions with an old-time flavor, such as "let a quart of milk come to a boil," "take a large white Bermuda onion," or "take any good ham, not necessarily a very expensive one."

The author's foreword contains the following delightful quotation:

" 'Case cookin's lak religion is—
Somes' 'lected, an' some ain't,
An' rules don' no mo' mek a cook
Den sermon's mek a saint."

M. P. H.

Dining and Wining in Old Russia. By Nina Nikolaevna Selivanova. New York: E. P. Dutton and Co., 1933, pp. 154. Price $2.50.

In this volume, by a member of a distinguished Russian family and the author of

"Russia's Women," we have what is probably the only lengthy account of Russian food customs and collection of recipes of Russian national dishes during the days of the Tsars. The author terms the "love of good food" one of the most salient features of Russian character, well exemplified in the *devotée* who had a comfortable inverted curve cut in his dining room table, and whose favorite *zakuski* (hors d'oeuvres) was a dainty bit consisting of twelve cans of sardines and two pounds of boiled rice.

Everyday meals and menus, holiday and other ceremonial food customs are discussed in a readable, interesting manner. The kitchens, storerooms and markets of the period also receive their share of attention.

M. P. H.

Strange Newes from China: A First Chinese Cookery Book. By Townley Searle. New York: E. P. Dutton and Co., 1933, pp. 231. Price $2.85.

Here we have an entrancing dissertation on Chinese food customs, a collection of 101 Chinese recipes, interspersed with innumerable Chinese proverbs and stories, a directory of desirable Chinese restaurants in the United States, a list of merchants from whom may be purchased the characteristic ingredients essential in the preparation of Chinese dishes, a catalogue of these foods with appended prices, and a glossary of information regarding the aforementioned foods.

William M'Fee, in reviewing (strangely enough) the book for the New York *Sun*, rather unkindly stated that the only adjective which completely described Mr. Searle's book is "cute." But then Mr. M'Fee is not a fair choice of critic, either of literary style or food, in this instance. He confessedly, when lured to a Chinese eating place, sneaks off afterward for a chop and baked potato.

An interesting account of the Chinese and their shops and resturants in London's East End, in Edinburgh and Liverpool, is given. One chapter is devoted to Chinese alcoholic distillations of rice and famous imbibers thereof—wine capacity apparently being indicative of and an essential adjunct to literary output.

The author believes that the Chinese come next to the French in the art of cooking, and that simplicity, variety, cleanliness and "plenty of washing in running water" are the keynotes of Chinese cookery.

The book can be heartily recommended to addicts of Oriental foods.

M. P. H.

CURRENT LITERATURE

KATHLEEN M. LEWIS

American Journal Diseases of Children

Vol. 45, February, 1933

* Acid-base balance of new-born infants. Influence of cows' milk on the acid-base balance of the blood of new-born infants. E. Marples and V. W. Lippard.—p. 294.

Vol. 45, March, 1933

* Effect of milk and modified milk on gastric contractions. F. W. Fetter.—p. 480.

Determination of the iron content of the blood in children. I. P. Sobel and I. J. Drekter.—p. 486.

Infant nutrition. Lactic acid milk; has it solved the problems of infant nutrition? J. R. Gerstley.—p. 538.

Vitamin D. F. F. Tisdall.—p. 619.

ACID-BASE BALANCE OF NEW-BORN INFANTS. The acid-base balance of infants' blood is definitely affected during the short period of partial dehydration and starvation in infants within the first few days of life. The decreased alkaline reserve that occurs when the feeding is changed from human to cows' milk is probably due to the greater amount of inorganic constituents in cows' milk. Changes in the acid-base equilibrium of new-born infants are more easily induced than in children or adults due to the ability of the kidneys of the latter to maintain a balance. Infants receiving cows' milk have a lower CO_2 content of the serum accompanied by a decrease in the pH and an increase in unanalyzed acid. The cause of this lowered CO_2 content of the serum is not known.

EFFECT OF MILK AND MODIFIED MILK ON GASTRIC CONTRACTIONS. The gastric contractions of four children were made following the intake of different milk foods. The studies indicate that gastric motility after the ingestion of whole cow's milk is very low, but is improved and influenced favorably by its acidification—that is, lactic acid milk, protein milk and buttermilk. The experiment showed little difference in the digestibility of milk or milk to which junket had been added.

American Journal of Physiology

Vol. 103, February, 1933

* The effect of overdoses of irradiated ergosterol, administered for approximately two months, on the composition and structure of the bones of rats. J. H. Jones and G. M. Robson.—p. 338.

A study of vitamin A deficiency in normal and depancreatized dogs. E. P. Ralli, A. Pariente, G. Flaum and A. Waterhouse.—p. 458.

The nutritive deficiency of milk with specific reference to manganese, energy and pituitary relations. E. C. Van Donk, H. Steenbock and E. B. Hart.—p. 468.

THE EFFECT OF OVERDOSES OF IRRADIATED ERGOSTEROL, ADMINISTERED FOR APPROXIMATELY TWO MONTHS, ON THE COMPOSITION AND STRUCTURE OF THE BONES OF RATS. Experimental rats were fed low calcium diets and massive doses of ergosterol. On examining the skeleton, a decrease in the ash of the bones was found. Porosity of the bone was also noted as a result of decreased organic elements. When ergosterol was given in large doses, the amount of ash was greater than with toxic doses because of decreased development of osteoid tissue. Vitamin D appears to act as a preventive in the growth of osteoid tissue.

American Journal of Public Health

Vol. 23, February, 1933

Health aspects of fruit beverages. W. H. Eddy.—p. 129.

Vol. 23, March, 1933

Antirachitic activation of milk by direct irradiation with ultraviolet rays. G. C. Supplee.—p. 225.

* Production of antirachitic milk by the feeding of dairy cattle. J. G. Hardenbergh and L. T. Wilson.—p. 230.

PRODUCTION OF ANTIRACHITIC MILK BY THE FEEDING OF DAIRY CATTLE. Irradiated yeast and irradiated ergosterol were fed and compared as sources of vitamin D for dairy cattle. It was found that both increased the vitamin D potency of milk to 16 times that of milk from cows receiving no supplement. Clinical tests on the milk were carried out, and it was found almost without exception

to prevent as well as cure rickets, even after pasteurization, and in one case after 5 minutes of boiling.

Samples of breast milk from nursing mothers who were fed vitamin D milk, showed an appreciable increase in antirachitic potency.

The antirachitic effectiveness of activated milk, as compared with cod liver oil and ergosterol, shows that one quart of milk, representing 160 units, has the efficiency in preventing rickets of 15 cc. of standard cod liver oil (220 units), or 10 drops of viosterol (830 units).

It is of utmost importance that the production of such special milks for general consumption be surrounded with adequate safeguards to protect the consumer and prevent the marketing of sub-standard products.

American Restaurant Magazine

Vol. 16, February, 1933

Foods for the famous February holidays. H. Ewing.—p. 17.

* Even the admirals-to-be must eat. L. H. Avery.—p. 24.

Vol. 16, March, 1933

* Service manuals help build employee efficiency. H. C. Siekman.—p. 19.

Foods that fit the student's pocketbook. H. Ewing.—p. 28.

EVEN THE ADMIRALS-TO-BE MUST EAT. Every step in the preparation of the food at the Naval Academy is arranged to eliminate work, protect and preserve the flavor of food, and get *hot* food to the table *hot*. Fresh fruits, vegetables and canned goods are bought from the pick of the Baltimore markets. The Commissary Department has found it more satisfactory and economical to buy hinds of beef, racks and legs of lamb than to purchase the whole carcass as was formerly done. The Naval Academy dairy is producing milk with a lower bacteria count than the highest grade of certified milk. The Academy boasts, also, a completely equipped bake shop; and with the purchasing of a new equipment for toasting bread, the efficiency in output has been increased. In so far as possible, equipment that is fool-proof has been selected; thus, speed and efficiency have been obtained.

SERVICE MANUALS HELP TO BUILD EMPLOYEE EFFICIENCY. Restaurateurs are placing great stress upon printed manuals of service in one form or another except, perhaps, a few who are still resorting to classroom instruction, apprenticeships, or education moving pictures. As a result of an extensive survey, the *American Restaurant Magazine* has collected a wide and varied assortment of these manuals, some of which lay stress upon tabulated duties and others upon company spirit, loyalty, and coöperation. The article has included a copy of the working manual of the Golden Pheasant, San Francisco, which gives a good idea of the arrangement and variety of subjects covered. A brief résumé and a few quotations are given from the Fowler lunch manual and the B/G standard of practice, the latter being somewhat different in including a catechism of questions any employee might ask.

Hospital Management

Vol. 35, February, 1933

Presbyterian Hospital utilizes pineapples' versatility. H. Ashcraft.—p. 46.

Economics in food service practiced in 1932.—p. 52.

Vol. 35, March, 1933

* Factors affecting food costs. K. Daum.—p. 46.

Food cost figures need explanation. L. Hamilton.—p. 46.

Good china reduces breakage. M. MacLochlan.—p. 50.

FACTORS AFFECTING HOSPITAL FOOD COSTS TODAY. The University of Iowa Hospital found that a surprising saving could be made by the efficient utilization of employees' time. Study of plate waste proved more satisfactory than study of total waste. Waste was controlled by the use of standardized recipes and standardized portions.

Hotel Monthly

Vol. 41, February, 1933

A guide to buying institutional china. E. H. Handy.—p. 37.

What is food control? H. E. Dupar.—p. 42.

Spices and nuts that enrich the menus. A. Shircliffe.—p. 46.

Vol. 41, March, 1933

Menus for special occasions. A. Shircliffe.—p. 30.

A baking powder symposium.—p. 40.

Journal American Medical Association

Vol. 100, February 4, 1933

* Epilepsy and narcolepsy associated with hyperinsulinism. S. Harris.—p. 321.

Vol. 100, February 25, 1933

Anemia of pregnancy. V. C. Rowland.—p. 537.
Minimum cost dietaries for diabetic patients. W. A. Groat and M. I. Rosbrook.—p. 566.

Vol. 100, March 4, 1933

* Use of liver extract intravenously in the treatment of pernicious anemia. R. Isaacs, C. C. Sturgis, S. M. Goldhamer and F. H. Bethell.—p. 629.
A second case of gastro-intestinal allergy due to insulin. J. R. Williams.—p. 658.

Vol. 100, March 11, 1933

Renal rickets. A. R. Elliott.—p. 724.
Diabetes mortality in New York. G. J. Drolet.—p. 733.

Vol. 100, March 18, 1933

Further studies on the use of wheat bran as a laxative. G. R. Cowgill and A. J. Sullivan.—p. 795.
Hereditary diabetes insipidus. W. Chester.—p. 806.
Dyinsulinism. J. Love.—p. 814.

EPILEPSY AND NARCOLEPSY ASSOCIATED WITH HYPERINSULINISM. Epilepsy is thought by many to be symptomatic of an organic disease. Attacks of convulsions and unconsciousness with spontaneous recovery resembling epilepsy, have been reported as having been brought on both accidentally and experimentally by overdoses of insulin. Several cases of epilepsy and narcolepsy have been associated with hyperinsulinism. In these cases there has been hypoglycemia during and before the convulsive attacks. Dextrose tolerance tests have shown that the patients had severe hyperinsulinism. The use of bromides in such cases shows an inhibiting effect upon the secretion of insulin; the use of bromides is not encouraged, but a low carbohydrate, high fat diet with frequent feedings sufficient to maintain the blood sugar level at a point above which hypoglycemic convulsions occur is advisable. Six cases, where there was a recurrence of the attacks of convulsions, were relieved by surgery; three for removal of adenomas and three for partial resection of the pancreas.

It is predicted that the surgeon in the future will learn from experience to estimate the amount of pancreatic tissue to resect in order to give relief from hyperinsulinism as they have done in the past in treating hyperthyroidism.

USE OF LIVER EXTRACT INTRAVENOUSLY IN THE TREATMENT OF PERNICIOUS ANEMIA. Liver extract in its original form contains certain substances which cause reactions in many patients. It is recommended that in pernicious anemia intravenous injections from 100–125 gms. of liver be made weekly until the red blood cell count reaches normal. The dosage varies with the individual, however, and proper checks should be made to determine the dosage. The intravenous method is superior in many respects to any other method. Favorable response has been reported from patients receiving intravenous liver extract, who made no response to liver or desiccated hog stomach given orally.

Journal Biological Chemistry

Vol. 99, February, 1933

Diet and blood cholesterol in normal women. R. Okey and D. Stewart.—p. 717.

Vol. 100, March, 1933

* The influence of high and low fat diets on the quality of the fat formed in the fetus of the rat. I. L. Chaikoff and A. Robinson.—p. 13.
Inorganic salts in nutrition. The mineral metabolism of rats receiving a diet low in inorganic constituents. R. O. Brooke and A. H. Smith.—p. 105.
The extraction of the antineuritic vitamin from dried brewers' yeast. S. Seidell.—p. 195.
* Vitamin D and the conservation of calcium in the adult. The effect of vitamin D on calcium conservation in adult rats maintained on low calcium diets. V. M. Templin and H. Steenbock.—p. 209.
Vitamin D and the conservation of calcium in the adult. The effect of vitamin D on the teeth of rats. V. M. Templin and H. Steenbock.—p. 217.
Glutamic acid in the treatment of experimental anemia. T. H. Rider.—p. 243.
The unsaponifiable lipids of beef liver. Methods of separation; crystalline fractions. C. F. Freytag and H. G. Smith.—p. 309.
The unsaponifiable lipids of beef liver. Vitamins A and E's antioxygens. C. F. Freytag and H. G. Smith.—p. 319.
* The effect of protracted exercise, intestinal fermentation, and modification of diet on the attainment of abnormal respiratory quotients by rats on a fat-deficient intake. L. G. Wesson.—p. 365.

STUDIES IN FETAL FAT. I. THE INFLUENCE OF HIGH AND LOW FAT DIETS ON THE

QUALITY OF THE FAT FOUND IN THE FETUS OF THE RAT. There is little variation in the iodine values of fetal fat of rats despite the variation in the fatty-acid make-up of the diets, which, however, causes a decided change in the maternal fat iodine number. The fetal fat ranges in iodine number from 61.5 to 103, while the maternal fat is 36.3 to 145. Within the variations of the fetal fat, the fat of the diet or the fat metabolism of the mother influences the character of the lipids of the fetus. No difference in the range of iodine values of fetal fat was noted whether the diet was high in protein or high in carbohydrate. The fetus, therefore, may be able to form fat synthetically, or fat may be transferred through the placenta and once in the fetus there is a qualitative transformation of the fat, the fetus thus being capable of metabolic transformation of fat. Dietary fat is not transferred to the fetus unaltered.

VITAMIN D AND THE CONSERVATION OF CALCIUM IN THE ADULT. II. EFFECT OF VITAMIN D ON CALCIUM CONSERVATION IN ADULT RATS MAINTAINED ON LOW CALCIUM DIETS. Adult female rats were subjected to a diet containing 0.058 per cent calcium and no vitamin D for eight months, resulting in apparent premature senile condition with loss of weight, lowered blood calcium but no tetany, hypertonic condition of the muscles after 15th week, and a 10 per cent reduction in ash of the femurs. The introduction of moderate amounts of vitamin D in the diet provided protection from mineral losses to the extent that only about 6.5 per cent ash was lost from the femurs. Weight losses were greatly reduced, the calcium content of the blood was increased, and the parathyroids were maintained at normal size. Vitamin D administered in any amount cannot compensate fully for the extreme lack of calcium or other dietary essentials, but conserves calcium and phosphorus to a remarkable degree.

THE EFFECT OF PROTRACTED EXERCISE, INTESTINAL FERMENTATION, AND MODIFICATION OF DIET ON THE ATTAINMENT OF ABNORMAL RESPIRATORY QUOTIENTS BY RATS ON A FAT-DEFICIENT INTAKE. Intestinal fermentation causes the formation of CO_2 in such small amounts that only negligible rises were noted in the respiratory quotients of rats which exhibited abnormally high carbohydrate assimilatory respiratory quotients. As compared to controls on normal diets, rats on fat deficient diets, when experiencing profound exercise over a period of 7–29 days, exhibit no increased carbohydrate assimilatory respiratory quotients. The addition of protein or vitamins A, D or B complex in highly purified form produced no appreciable effect on these results; nor did the respiratory quotient change on succeeding days under similar conditions of restricted diet.

Modern Hospital

Vol. 40, February, 1933

Better food and the satisfied patient. M. Abelman.—p. 47.

* Comparing costs of metabolic diets. J. E. Smith and H. B. Anderson.—p. 104.

Vol. 40, March, 1933

* Running the dietary department as a five-unit plan. G. I. Thomas.—p. 116.

COMPARING COSTS OF METABOLIC DIETS. This article shows the costs of various metabolic diets, and also interprets the variation in cost from the normal diet. Formulas for each disease and the average American diet were taken from various sources. Prices were obtained from a national chain store. Household quantities were used and the cost of each serving was computed. The normal diet was found to be the least expensive per hundred calories. The daily cost of the diabetic, cardiac and obesity diets were less than the normal, but the caloric intake was less. The cost varies proportionally with the amount of protein in the diet. Nephrosis, nutritional and pernicious anemias rank as the most expensive of special diets, due to the fact that there is an increase in the protein without an increase in the caloric intake. Carbohydrates are the cheapest source of energy after the bulky fruit and vegetable need has been met. This brings out quite clearly how an increase in the protein food, fruits, and vegetables in the family dietary would increase the daily expenditure for food.

RUNNING THE DIETARY DEPARTMENT ON A FIVE UNIT PLAN. During the last five years the dietary department of the University of Minnesota Hospital has developed a five unit arrangement with five graduate dietitians. From the diet laboratory an average of sixty-five special diets are sent out daily.

The department is situated in the comparatively new wing and its ideas are modern with special thought given to light, ventilation and labor saving devices. There is a Nutrition Clinic for the instruction of patients and parents of patients, the family budget being considered. The Nurses' Dining Room has the "four" table plan, with cafeteria service at breakfast and waiters at lunch and dinner.

Practical Home Economics

Vol. 11, February, 1933

Equipment and layout for high school cafeterias. M. Westfall and J. Adams.—p. 47.

A study of the management of lunchrooms. E. B. Mullins.—p. 49.

Vol. 11, March, 1933

* The development of cooking. E. Brannigan.—p. 74.

Buying the institutions groceries. L. H. Luebbers.—p. 82.

THE DEVELOPMENT OF COOKING. This history of the development of cooking from primitive times to the middle ages shows the gradual changes brought about by the progress of civilization and takes up the Grecian, the Egyptian, the Roman and early European influences.

NEWS NOTES

The Sixteenth Annual Convention of the American Dietetic Association will be held at the Palmer House, Chicago, October 9 to 12 inclusive. The program will consist of day meetings only. The evenings, with the exception of Tuesday evening, reserved for the annual banquet, will be left available for other interests.

Three general sessions are planned for the afternoon meetings with section meetings in the morning. Speakers of note are being secured for the general sessions and interesting and important work, which will be reported, is under way in the sections. Trips of a general and professional interest are being arranged for Friday.

The Chicago Dietetic Association, Lida Jamison, President, Chicago Dietetic Supply House, 1750 W. VanBuren Street, has plans under way for caring for the general and professional interest of the association members. Local committees have been appointed with the following chairmen: Hospitality, Mary Bogie Smith; Publicity, Rose Straka Fowler; Tickets, Sarah Elkin; Trips, Ann Boller; Program, Elsbeth Hennecke.

The Century of Progress plans include a special Chicago day on October 9. That day will therefore be given over largely to registration, and the afternoon left open for visiting the Exposition. The eleven major buildings house much of special interest to a professional group. The Hall of Science will display the progress in the basic sciences and in medicine. Here the much talked of "transparent man" will be on exhibit. The Transportation Building will present the pageant of transportation. The Electrical Building exhibits the development and marvels of applied electricity. Radio and Communications Building shows the "Conquest of Time and Space." The Hall of Social Science tells a comprehensive story of the growth of social science. The development of home building is the theme accented in the Home and Industrial Arts Building. The Agricultural Building shows the vivid story of agricultural progress including the story of our meat supply. The Dairy Building describes vividly the progress in manufacture and distribution of the dairy products.

The Chicago Dietetic Association and your "Home Office" cordially invite you to Chicago to help make October 9 to 12 an enjoyable, stimulating, profitable week.

M. FAITH MCAULEY, *Chairman,*
Program Committee.

The marriage of Dorothy I. Lenfest, daughter of Mr. and Mrs. Isaac Reid Lenfest, of Presque Isle, Maine, and business manager of the American Dietetic Association, to Mr. Francis William Jacob, took place on March 11. Members of the Association will be pleased to learn that Mrs. Jacob will continue her connection with the Association at least until the annual meeting.

Among the interesting activities of members who have retired from active professional work is that of Mrs. Thelma Tubbs Currier who has been working on a child welfare committee in the town of South Manchester, Conn. Recently this committee has undertaken the task of developing their small group into a large Public Health Nursing Association with three nurses to help the community as a whole. Mrs. Currier feels that there is great need of trained people in all communities to work with local committees whose interest in health and nutrition programs is hampered by their lack of knowledge of methods of procedure.

The following additional appointment has been made in the Association: Dorothy Moore, Children's Hospital, Iowa City, has been appointed to the Investigation Board.

A daughter was born to Dr. and Mrs. James H. Huddleson on April 25th. The child will be named Ellen Pascoe Huddleson. Mrs. Huddleson is the editor of this JOURNAL.

The American Child Health Association will hold its seventh Health Education Conference in Ann Arbor, Michigan, from June 20 to 24, inclusive, at the invitation of the University of Michigan, Summer Session. As previously, the conduct of this Conference will be characterized by the coöperative work of all members, and the discussions will center on practical problems in the school health program in teacher, secondary, and elementary education. Problems will be selected which have a common vital interest to all agencies in any way connected with school health activities. The purpose of this Conference is to: (1) chart some significant trends and characteristics in the growth of present school health programs; (2) clarify a few definite problems of basic significance which apparently tend to retard the future growth of programs and, in relation to these problems to (3) formulate, through group thinking, sound principles and unified policies which will be of practical constructive value in liberating the potentialities of school health programs. For further information in regard to this Conference write to Miss Anne Whitney, Director of Educational Service, American Child Health Association, 450 Seventh Avenue, New York City.

International Hospital Association. Announcement of the 3rd International Hospital Congress to be held June 28 to July 3, 1933, has recently been made. This Congress will be held at Knocke Sur Mer, Belgium. Morning and afternoon sessions will be held during the five days and will consider the reports of ten International Study Committees. Resolutions will be made and passed on to the League of Nations and to the governments concerned. The committee of most interest to our Association is that on dietetics, under the chairmanship of Prof. Dr. A. v. Soós, Director of the Institute of Dietetics of the University of Budapest, Balassa utca 8, Budapest. Associations and persons interested are invited and welcome as coöperators in these study committees. Following the Congress, a five day study tour through Holland will be held, visiting hospitals and other points of interest. The program of the Congress and tour is planned so that all participants can take part in the World Congress of Hospital Nurses which begins in Paris on July 9.

Any members of the American Dietetic Association who would like to attend this Congress are asked to communicate with Dr. Daum so that representation of the Association could be planned for.

Chicago Dietetic Association. Faith McAuley of the Home Economics Department of the University of Chicago is giving a series of six lectures on "Marketing" to members of the Association.

The marriage of Nell Taylor of Michael Reese Hospital has recently been announced.

Mr. John Dinsmore, University Clinics, spoke on "The Dietitian's Relationship to Hospital Administration" at the March meeting of the Association.

A card party was given at the new Nurse's Home of the Children's Memorial Hospital on March 23. Margaret Cowden, dietitian at Childrens' Memorial Hospital, showed the members through the kitchens and dining rooms.

The Detroit Dietetic Association, formerly known as the Southeastern Michigan Dietetic Association, was organized about a year ago. The following is a résumé of the meetings of the year 1932–1933.

Dearborn Inn was the setting for the first meeting of the year at which plans for the next year were made. Dr. Martha Koehne was the speaker and plans for the national convention were discussed. Dr. Icie Macy was a guest of honor with Dr. Koehne.

Neva Hirleman, Sophie Halsted and Madeline Wiseman reported on the American Dietetic Association convention at the November meeting held at the Hotel Statler.

The Community Education Section, whose chairman is Leila McGuire, sponsored the meeting at the Merrill Palmer School. Sophie Halsted spoke on the contribution of the Board of Health Nutrition Service to community education. Leila McGuire told about the origin and work of Merrill Palmer School in community education. Rhea

Schulman reported on the work done at North End Clinic in educating the public as to food costs and standards.

The members of the Association were guests of Mr. Pichler, manager of the Hotel Statler, at an enjoyable Valentine buffet supper and bridge.

Marie Graham Diton, chairman of the Diet Therapy Section, was in charge of the March meeting held at Harper Hospital. Dr. Frederick G. Buesser, associate professor of Gastroenterology, Detroit College of Medicine, and attending physician of Harper Hospital, gave an illustrated talk on the "Etiology and Treatment of Gastric Ulcer." Mrs. Diton demonstrated the preparation of mucin.

Mrs. Walter Boughner (Mabel Gettel) now resides at Algonac where Dr. Boughner practises medicine.

Mrs. Richard Blair (Katherine Ellis) has moved to 61½ Chestnut Street, Walthan, Massachusetts.

Mrs. Eulalia Blair has returned to her home at Hanover, Michigan, after six months relief work at Fremont General Hospital at Fremont, Ohio.

Madeline Wiseman, formerly of Harper Hospital staff, has returned to her home at Willow Hill, Illinois.

Margaret Colby is the metabolic dietitian at Herman Kiefer Hospital.

Dale MacLeod is the metabolic dietitian at Eloise Hospital.

Rose Burgess, formerly of Harper Hospital is now dietitian at the Woman's Hospital, Flint, Michigan, succeeding Fern Sutherland Munger.

Anita Shaeffer has taken a position at Shehoygon, Wisconsin.

Dr. Helen Hunscher of the Children's Fund is teaching the Nutrition Seminar at Detroit City College which is being attended by a number of Detroit dietitians.

The Greater New York Dietetic Association met with the New York nutritionists, March 13, at the American Red Cross Building, New York City. After a dinner the joint meeting was held in the Memorial Assembly. Dorothy DeHart, president of the local dietetic association presided. Elizabeth Guilford, president of the nutritionists' group spoke on "The Nutritionists and the Work They are Doing." The dietetic association members had been asked to speak of their work and the following members took part in the discussions: Lulu Graves, "The Consultant Deititian"; Alice McCollister, "The Restaurant Dietitian"; Lenna Cooper, "The Hospital Dietitian;" Edith Barber "Free Lance Work"; Sylvia Lee Bayard, "Commercial Research"; Gladys Hill, "Clinic Research"; and Joelle Long, "Dietitian in the Schools." A short business meeting was held.

On March 22 the Association was invited by Lenna Cooper of Montefiore Hospital to attend a dinner and lecture given to the doctors and nurses of the hospital at which Dr. Sherman was the guest speaker. His topic was "Some Trends in the Chemistry of Nutrition and the Significance of Protective Foods." The meeting was well attended and helped to swell the Association's contribution toward the Unemployment Relief Fund. Miss Cooper devoted a portion of the money collected for the dinner toward this fund.

The Illinois State Dietetic Association sponsored the second annual Midwest Regional Meeting, with the assistance of the Chicago Dietetic Association, at the Belden-Stratford Hotel, Chicago, February 10 and 11, 1933. On the first morning trips were made to Augustans, Passavant, and Wesley Memorial Hospitals. A market trip at the same time was conducted by Faith McAuley. At the Friday meeting, with Sarah Elkin, President, presiding, the following papers were given: "Newer Aspects of Infant Feeding," A. H. Parmelee, M.D., Clinical Instructor in Pediatrics, Rush Medical College; "Calcium Balance in Growing Children," Mrs. Thelma Porter Levin, Associate Professor of Nutrition, University of Chicago. These papers were followed by a report of the Administration Section by Louise Gilbert, chairman, and a business meeting.

Sarah Elkin presided at the joint annual dinner of the Illinois Dietetic Association and the Chicago Dietetic Association.

Guests of honor included Clifford Barborka, M.D., Leo Campbell, M.D., Marietta Eichelberger, Ph.D., Mrs. Elsa Lord, Leo Markin, M.D., and Lawrence Mayers, M.D., the 1932 speakers of the Chicago Dietetic Association. Dr. Kate Daum brought greetings from the national Association; Mrs. Laura H. Lundi, Illinois League of Women Voters, spoke on "Vitamin X—What is Lacking in Government"; and Dr. Malcolm T. MacEachern, M.D., C.M., Director of Hospital Activities, American College of Surgeons, spoke on "Requirements for Food Service in Approved Hospitals."

Lida Jamison, President of the Chicago Dietetic Association, presided at the Saturday morning session. An address on "Food Poisoning and Infections" was given by F. W. Tanner, Ph.D., Head of the Department of Bacteriology, University of Illinois, and one by Solomon Strouse, M.D., Associate Professor of Medicine, Rush Medical College, on "Newer Concepts of Dietary Management of Kidney Disease," following which Frances Floore, chairman, presented the report of the Diet Therapy Section.

Following the luncheon at which Sarah Elkin presided, Helen Bennett, Social Science Division, The Century of Progress, spoke on "More World's Fair." Evelyn Smith, first vice president of the Illinois association, presided at the afternoon meeting. Adelaide Spohn, Ph.D., gave an address on "Organization of Nutrition Work—Emergency Relief," and Frances Swain, M.A., Director of Household Arts, Chicago Public Schools, one on "Teaching Nutrition—School Lunch Room Aspect." The report of the Community Education Section, by Anna E. Boller, chairman, followed. The meeting closed with a tea at the Belden Stratford.

Kentucky dietitians, according to word from Lucille Hawkinson of Louisville City Hospital, are organizing a state group with a view toward national affiliation.

The Massachusetts Dietetic Association held a meeting March 14 when one of its members, Ellen A. Riley of the Women's Educational and Industrial Union gave a talk on her work at the White House during President Coolidge's administration.

On March 21 about forty of the student dietitians of the Boston Hospitals went on a field trip to the H. A. Johnson Company which proved most educational and interesting. They were conducted over the entire eight floors of the building, seeing the storage plant and the kitchens, where the chef gave a demonstration on cake baking and icings. Mr. Irving Ross gave a talk on canned goods.

A group of Boston dietitians, actively supporting American Dietetic Association accredited student dietitian courses, were the guests of the student dietitians of the Women's Educational and Industrial Union on Friday, March 17. The Union Student dietitians meet each Friday afternoon for a conference and tea with Mrs. Quindara Oliver Dodge, director, and Cecilia A. McCarthy, associate director of student training. These weekly teas have surpassed all expectations as a means to develop student social poise. Madelene Hallock was the student hostess for the St. Patrick's tea, and Harriet Schupp chairman of the student project under discussion, "The Union Student Dietitian Code of Ethics." Among those present who made helpful suggestions to the students, were Mrs. Octavia Hall Smillie, Marion Floyd, Gertrude McDonald, Margaret McGovern, Maniza Moore, Martha Stuart and Rosina Vance.

The following new members in the Association this past month are active members: Sara Thames, Simmons College: Janette Kelhy, Director Home Economics Department, Lever Brothers, Cambridge; Florence Griffith, Massachusetts Memorial Hospital; and Margaret E. Shaw, Robert Bent Brigham Hospital. The following are associate members: Lillian Robinson, Whidden Memorial Hospital; Dorothy Lewis, Cambridge Hospital; Virginia E. Stewart, Cambridge Hospital; and Mrs. Charles McCarthy.

At the April meeting, Mr. James A. Hamilton, former president of the New England Hospital Association and at present superintendent of the Mary Hitchcock Hospital, Hanover, New Hampshire, spoke on "Hospital Organization—The Relationship of the Dietary Department."

The Minnesota Dietetic Association. The November meeting was sponsored by the

Social Service Section. Speakers included Mr. A. A. Heckman, head of the Wilder Institute of St. Paul, Mrs. Allan Briggs, volunteer consultant dietitian for the Wilder Institute, and Agnes Larson of the St. Paul Department of Education. Various phases of welfare work were discussed. The place of the dietitian in such work was also stressed.

The December meeting, planned by the Professional Education Section, was held on the University of Minnesota agricultural campus. A business meeting opened the program and was followed by convention reports by Lucile Townsend, Lyl Borak and Lillian Lunquist. A delicious dinner was served after which Dr. Jane Leichsenring and Alice Biester, both on the faculty of the University of Minnesota Home Economics department, spoke on "Preparation of Students for Hospital Work" and "Training of Student Dietitians and Standards set by the American Dietetic Association."

The Administrative Section was in charge of the January meeting. Dr. H. L. Dunn, superintendent of University Hospital, and Gertrude Thomas, director of dietetics at the same hospital, discussed "Cost Accounting."

The first social meeting of the year was in February at Minneapolis General Hospital where Ethel Gough and Adelaide Jury were hostesses. Valentine appointments were used throughout. Bridge was followed by a delicious buffet supper.

New members of the association include: Theresa Agnich, Ely, Minn.; Frances Adelaide Doxtatoe, University Farm Campus, St. Paul; Ruth Branstad, until recently at Fairview Hospital, Minneapolis; Mary Ellen McLeod, Miller Hospital, St. Paul; and Ethel Carlson, New Asbury Hospital, Minneapolis.

Ruth Melges is spending three months in California to recuperate more fully from her accident of last summer.

The Nebraska Dietetic Association met with the Nebraska Academy of Science at the annual convention at Lincoln April 28–29. The following program was given jointly with the biochemistry section: "The Scientific Application of Recent Findings in Nutrition," Dr. Kate Daum, President, American Dietetic Association, "Review of Literature on Iron Metabolism," Dr. Rebekah Gibbons, University of Nebraska; "Metabolic Constants," Dr. C. M. Wilhelmj, Medical School of Creighton University, Omaha; and "The Acid Combining Power of Foods," Dr. Victor E. Levine, Medical School of Creighton University. The Nebraska Dietetic Association and the Lincoln nutrition and institution group entertained at a luncheon at the University Club for Dr. Daum.

New York State Dietetic Association. The annual meeting was held at Buffalo April 24–25. Through the courtesy of Dr. Walter Goodale, superintendent, and Ursula Senn, dietitian, meetings were held at the Buffalo City Hospital. Blanche Bohach, Rochester General Hospital, was chairman of the program committee.

The Pennsylvania State Dietetic Association is holding its first annual convention at the Shenky Hotel, Pittsburgh, this month. Dr. C. G. King of the University of Pittsburgh is speaking on "Current Progress in Nutrition," Dr. Leo Criep on "Allergy" and Dr. Joseph Barach on "Diabetes." A luncheon is being held at the H. J. Heinz House, and a trip through Dr. Barach's clinic, a buffet supper at Carnegie Institute, and a visit to the Mellon Institute were also planned by the program committee. Elizabeth Miller of Philadelphia General Hospital is publicity chairman for this meeting.

The Richmond Dietetic Association has had the most successful year since its organization. Due to the present economic conditions it was decided not to have refreshments at the regular monthly meetings. However, an interesting new feature was added to the program. At each meeting the hostess invited the guests to inspect her department. This not only gave members an opportunity to visit the departments and discuss personnel subjects, compare equipment and methods of service, but it also added a social advantage.

The outstanding business of the year was

NOW READY

The Revised OUTLINES
OF
COURSES IN DIETETICS FOR NURSES

Normal Nutrition, Cookery and Diet Therapy for Student Nurses, and Nutrition for Public Health Nurses

Price - 25 cents

On Sale at

THE AMERICAN DIETETIC ASSOCIATION

185 North Wabash Avenue, Chicago, Illinois

(In writing advertisers, please mention the journal.)

the revision of the constitution. This was completed by checking it with the Constitution of the American Dietetic Association. A committee has also been appointed to compile the history of the local association as taken from the minutes.

The educational program of the season has been a study of parliamentary law. At each meeting ten minutes is given over to a report, followed by a discussion of parliamentary procedure. In December Dr. Fred J. Wampler, director of the out-patient department of the Medical College of Virginia, hospital division, reported on the dietary aspects of the recent research work he had done in celiac disease, followed by round table discussion.

The most inspiring meeting of the year was the February dinner meeting held at the John Marshall Hotel. The guest speakers and their subjects were Amalia Lautz, "The Trend of the Dietitian," and Katherine Leah, "The History of Dietetics." Miss Lautz is the director of home economics at the State Teachers College, Fredericksburg, Virginia. Miss Leah received her Master's Degree in nutrition at Seattle, Washington, and is now professor of public health nursing at the school of social service of the College of William and Mary, Extension Division, Richmond, Virginia.

The Rochester Dietetic Association has been enjoying a successful year with a large attendance at all of the meetings. The September meeting was a dinner, following which the association elected officers for the present year. Ellen B. Guernsey of Strong Memorial Hospital was re-elected as president.

For the October meeting the program committee under Marie Dutch arranged to have Dr. Harry D. Clough of the Rochester General Hospital as speaker. His subject was "An Analysis of 1,000 Metabolic Rate Determinations in Goitre."

In November Ruth Schmidt of the Birds Eye Frosted Foods Company told the association of its work and exhibited samples of its products.

Dr. Frieda S. Robscheit-Robbins of the University of Rochester Medical School presented an illustrated talk on "Anemia Studies" in December.

In January the association had Dr. Walter G. Eddy as its speaker. His talk on "Present Day Theories of Vitamins" was greatly appreciated.

In February "Food Habits in Persia" were discussed by Miss Taille who recently returned from hospital work in that country.

The annual party of the association was held in March. At this time the members enjoyed a dinner-bridge at Ye Olde House in Rochester.

The Tri-State Dietetic Association held its fourth annual meeting in Birmingham in February. Georgia has become a member association of the Tri-State, taking the place of Arkansas which has no active organization; members of this state will, however, continue to be eligible to membership in the Tri-State. Dr. Kate Daum, Dorothy Lenfest and Faith McAuley attended the meeting, Dr. Daum being the dinner speaker. Anna M. Tracy, May McClevey and Dr. J. D. Dowling were the speakers at the morning session. At the luncheon, presided over by Dean Agnes E. Harris of the University of Alabama, Dr. John Xan of Howard College, Birmingham, spoke on "Synthesis of Carbohydrates in Nature." The speakers at the afternoon session, presided over by Margaret M. Edwards were: Dr. Groesbeck F. Walsh on "Effect of Insulin in Diet of Undernourished Individuals;" Dr. Cecil D. Gaston on "Proctology and Diet;" and Dr. James Garber on "Diet in Pregnancy and Lactation." In the evening Dr. Seale Harris spoke on "Diet in Gastric Ulcer" and Dr. Clifford Lamar presented a paper on "Diet in Relation to Chronic Fatigue in Childhood."

Officers for the ensuing year were elected as follows: President, Fairfax T. Proudfit; 1st Vice President, Juliette Hamilton; 2nd Vice President, Mrs. Norman Newsom; Secretary, Ina Barbee; Treasurer, Blanche Tansil.

Two interesting bulletins have been recently received from Margaret M. Edwards, director, School of Home Economics, Alabama College, Montevallo. One announces the Extension Division Inter-High School Meet in Home Economics, which has

Behind these statements about

CANNED-PINEAPPLE

..a new, accurate appraisal of the fruit's dietetic values

AMONG other notable dietetic assets, disclosed by the recent, comprehensive study of Canned Pineapple, are three important findings:

1. **Vitamin Content.** Assays show that an eight ounce serving of the fruit, including an aliquot of juice, supplies an average vitamin A potency of 72 units (Sherman and Munsell), approximately 56 units of vitamin B (B_1) (Sherman and Chase), and from 32 to 56 units of vitamin C (La Mer, Campbell and Sherman).

2. **Alkalinizing Influence.** It is now established by feeding tests that Canned Pineapple aids effectively in maintaining normal alkalinity of the blood plasma. After consumption of the fruit by test subjects, an increase in alkaline reserve is noted, which appears promptly and persists for at least two hours.

3. **Hematogenic Effect.** The tests show that due to its high iron and copper content, Canned Pineapple with its juice has a marked hematogenic or blood building power.

Together, these findings—in addition to other valuable factors—lend new importance to Canned Pineapple, as a fruit that may advantageously be included in the average daily diet.

And because they are based on comprehensive tests, following recognized food assay methods, they provide an accurate appraisal of the fruit's nutritional value.

Educational Committee

PINEAPPLE PRODUCERS COOPERATIVE ASSOCIATION, LTD.
100 Bush Street, San Francisco, California

Copr. 1933 by Pineapple Producers Cooperative Association, Ltd.

(In writing advertisers, please mention the journal.)

been sponsored by the school for several years, and which has been a valuable stimulus for better coördinated interest and work for a state-wide home making education program. The other is "Healthful Low-Cost Feeding of Alabama Families."

The Eighth Hermann Michael Biggs Memorial Lecture of the New York Academy of Medicine was delivered by Dr. H. O. Mosenthal in April. His subject was "Diabetes Mellitus; Problems of Present Day Treatment." Discussers included Dr. Charles Bolduan, Dr. E. P. Joslin, Dr. N. B. Foster, and Mr. L. I. Dublin.

Dr. H. C. Sherman of Columbia University has been awarded the medal of the American Institute of Chemists in recognition of his analyses of food and his services in training other chemists, according to the New York *Evening Post* of April 4. The medal is given annually for outstanding service to chemistry in America. The medal will be presented to Dr. Sherman at the annual meeting of the institute this month. Dr. Charles H. Herty, who discovered a process for making paper from Southern slash pine, won the medal last year.

A round table discussion on the present status of vitamins was held February 20 at the New York Academy of Medicine. The following papers were presented: "Discovery of Vitamins," Giuseppe Previtale, M.D.; "Vitamins in Relation to Health," Edwin J. Quinn, M.D.; "Vitamins in Relation to the Eye," Daniel Kirby, M.D., "Vitamins in Relation to Nutritional Anemia," John Killian, Ph.D.; "Relation of Vitamin D to Ultraviolet Rays," Peter F. Amoroso, M.D. and "Newer Aspects of Vitamin A and D Deficiency," Adoph de Sanctis, M.D.

An interesting booklet, "A Brief Account of the Tea Plant," is procurable for the asking from the Stewart and Ashby Coffee Co., 845 W. Washington Blvd., Chicago. This is a reproduction of a pamphlet originally published in 1790, and dedicated "to the ladies," by the London Genuine Tea Company. This reproduction was made through the courtesy of Mr. Arnold Shircliffe, who owns an original of the booklet.

The Ahrens Publishing Company announces the services of their newly formed Food Service Research Bureau, under the leadership of J. O. Dahl, Louis Paquet, and Alice Easton. This bureau has a consulting board of about two hundred food executives. It is in a position to prepare new quantity recipes, perfect old quantity recipes, adapt home recipes to quantity service, develop new uses for foods and give food demonstrations, among many other activities. Further information may be obtained from the Ahrens Company, 222 East 42nd Street, New York City. Mr. Dahl, Director of the Bureau, has recently prepared an interesting manual, "The Efficient Waitress." Single copies are fifty cents.

Emma L. Feeney, assistant editor of the JOURNAL, will conduct a European Homes Tour this summer under the auspices of the American Institute of Educational Travel. The trip will begin July 1 and end August 19. The plans include visiting a modern home in each of the several countries visited, including Spain, Italy, Switzerland, Germany, Holland, France and England. Anyone interested is invited to communicate with Miss Feeney at Pratt Institute, Brooklyn.

Anna Boller, Director of the Department of Nutrition, National Live Stock and Meat Board, has been supervising the preparation of some interesting food charts and meat identification charts. "Ten Lessons on Meat" are also available from her office, as well as two new folders, "Good Meals at Low Cost" and "Nutrition Helps for the Welfare Worker."

Do you know as much about cereals as you do about milk—

WHEN a patient asks your advice about milk for children's diets you know immediately what milk is best. You specify *whole* "unskimmed" milk from a dairy which you know meets the standards set by recognized public health regulations.

But *what about cereals?* Knowing as much about cereals as you know about milk—you will insist that they too be "unskimmed." For just as milk cannot provide *full* food value if the cream is skimmed off—a wheat cereal cannot provide full value if any of the following 3 parts of the wheat berry are skimmed off in manufacture.

1. **BROWN**—(bran) containing generous quantities of phosphorous and iron—proteins of exceptionally good quality.

2. **WHITE**—(endosperm) a good source of carbohydrates for warmth and energy.

3. **YELLOW**—(embryo) one of the richest natural sources of the anti-neuritic, appetite-stimulating vitamin B.

Be sure the cereal you recommend is "unskimmed." Ralston contains the tiny brown, white and yellow particles. It is "unskimmed."

Ralston Wheat Cereal is *"unskimmed."* It is Double-Rich in Vitamin B!

Ralston Wheat Cereal provides the full food value of whole wheat (coarse bran removed)—the valuable inner bran layers, the endosperm and embryo. *But Ralston does even more than that!* It now provides more vitamin B than any other cereal—because it is enriched with two and one-half times the amount of yellow embryo normally found in whole wheat. Think what that means! In one delicious, economical, quickly cooked cereal your patient obtains the value of whole wheat—plus a double quantity of vitamin B.

To provide you with more comprehensive information regarding this "unskimmed" wheat cereal double-rich in vitamin B, a Research Laboratory Report on the new Ralston has been prepared. Samples for distribution to patients—and a copy of this report will be sent to you *free*, if you will fill out and mail the coupon below.

Ralston Wheat Cereal

RALSTON PURINA CO., 453 Checkerboard Square, Saint Louis, Missouri. Send me material as offered in your advertisement.

Name .....

Street .....*City*.....

This offer limited to residents of the United States

(In writing advertisers, please mention the journal.)

WHO'S WHO IN THIS ISSUE

DAVID MARINE, M.D., SC.D., was formerly Associate Professor of Experimental Medicine at Western Reserve University, and at present is Assistant Professor of Pathology, Columbia University, and Director of Laboratories, Montefiore Hospital. He specialized in general pathology and pathological anatomy, with research work mainly in the fields of internal secretion. Dr. Marine is especially noted for his work in the pathology and physiology of the thyroid, including the etiology of simple goiter and Graves' disease, and the pathology and physiology of the suprarenal, parathyroid and thymus glands.

ARTHUR H. SMITH, PH.D., Associate Professor of Physiological Chemistry at Yale since 1930, has published many papers dealing with nutrition and the chemical aspects of growth as well as a monograph on "Practical Procedures for Nutrition Experiments" in Abderhalden's *Handbuch*. He is a contributor to the section on nutrition in the *Annual Review of Biochemistry*, and a member of the American Society of Biological Chemists, American Physiological Society, American Chemical Society, and the Society for Experimental Biology and Medicine. WILLIAM E. ANDERSON, M.S., is Research Assistant in Physiological Chemistry, with the rank of Assistant Professor at Yale, and has published papers on biochemistry of fat formation and upon various other physiological chemical subjects. He is a member of the American Society of Biological Chemists and American Chemical Society. R. O. BROOKE, PH.D. and W. G. GORDON, M.A., are Assistants in Physiological Chemistry, Yale University.

MRS. THELMA PORTER-LEVIN was a contributor to the March issue of the JOURNAL.

FLORENCE QUAST and HELEN STRAND are in charge of the university cafeteria of Syracuse University as director and assistant, respectively. Miss Strand, a member of the American Dietetic Association, did the dietary calculations included in the paper.

EARL D. BOND, M.D., is a graduate of Harvard. Since 1930 he has been professor of psychiatry at the University of Pennsylvania. He is director of the Philadelphia Child Guidance Clinic and the Institute for Child Guidance in New York. His numerous affiliations include the American Psychiatric and American Neurological Associations. He has recently been honored by receiving the $10,000 Edward W. Bok Award as the citizen who gave the community the best service during 1932. Dr. Bond at once assigned the award for treatment of Philadelphia's indigent mentally deranged.

AVAILABLE REPRINTS

Anemia, nutritional, in infancy: its treatment with liver extract and iron. Joseph Greengard ..... $.15
Arthritis, chronic, Diet and nutrition in. A. A. Fletcher ..... .10
Bran on the alimentary tract, The influence of. Mary S. Rose, Grace MacLeod, Ella McC. Vahlteich, Esther H. Funnell and Catherine L. Newton ..... .25
Bran, Wheat, as a source of vitamin B. Mary S. Rose, Ella McC. Vahlteich, Esther H. Funnell, and Grace MacLeod ..... .30
Cafeteria management in large hotels. Margaret G. Brown ..... .12
Cafeteria, The pay. Mable M. MacLachlin ..... .12
Cakes, The percentage composition of cooked food mixtures. Martha E. Davis and Bernice Wait ..... .20
Canned foods, Standards for. Ruth Atwater ..... .15
Canning industry, The influence of the, in the changing dietary. E. F. Kohman ..... .10
Carbohydrate, Observations on the metabolism of. Dorothy Stewart Waller ..... .20
Cellulose, edible, Studies upon. Sybil Woodruff and Elma F. Miller ..... .10
Child, The, as a hospital problem. Lucille Streater ..... .15
Children, Chinese American, A study of. II. Physical measurements. Jean E. Hawks. .10
Children, Results of dietary and hygienic control of ten non-gaining preventorium. Nellie Hord and Lydia J. Roberts ..... .15
Clinical teaching, Methods of determining effectiveness of. Mary M. Harrington ..... .15
Cookery, Quantity. Arnold Shircliffe ..... .10
Cooking, Recent developments in the science of. Evelyn G. Halliday and Isabel Noble ..... .10
Dental caries, Present day theories of the cause of. Martha Koehne, Ph.D ..... .15
Diabetes and its complications, Diet in the treatment of. William J. Mallory, A.M., M.D ..... .15
Diabetes, A report of a case with complications. Fairfax T. Proudfit ..... .15
Diabetes mellitus and the clinician. J. A. Gilchrist ..... .15
Diet, Fitting the, to the family. Luise Kraus Addis ..... .12
Diets, therapeutic, Quality studies of: The nephritic diet. Sister M. Victor ..... .10
Diets, therapeutic, Quality studies of: The reduction diet. Elizabeth Hayward and Dorothy S. Waller ..... .10
Diets, therapeutic, Quality studies of: The ulcer diet. Lute Troutt ..... .10
Dietaries, Adequate, for sororities and fraternities. Bessie Brooks West ..... .05
Dietaries in a small hospital in Los Angeles, Cost of. Greta Gray and Leila Doman .. .10
Dietary department, Modernizing the. Clara Matthes and Helen Seago ..... .15
Dietary departments of hospitals, Personnel study of. Rose T. Baker ..... .10
Dietary departments, Opportunities for research in, from the administrative, educational and therapeutic standpoint. Malcolm T. MacEachern, M.D., C.M., D.Sc. .12
Dietetic department, The place of the, in the hospital from the administrator's viewpoint. E. S. Gilmore ..... .10
Dietitian, The, as an administrative officer in the institution. A. C. Bachmeyer, M.D ..... .15
Dietitians, Reducing the labor turnover of. Elizabeth Dyer ..... .15

"In Sickness and in Health"

MEAD'S CEREAL

ENRICHED WITH MINERAL AND VITAMIN CONTAINING FOODS

a preventive of dietary deficiencies

Mead's Cereal contains 9 of the 10 minerals and 4 of the 6 vitamins which McCollum declares to be indispensable elements in the diet.

SO RICH is Mead's Cereal in protective food factors that when supplemented with an antiscorbutic* and an antirickетic† it supplies all the vitamins and minerals needed by the body. Containing 6 times as much calcium as fluid milk, twice as much phosphorus as rolled oats and having more iron than any other food, Mead's Cereal is in addition high in copper (essential to iron metabolism) and in vitamin B complex. Clinical studies have shown it to be of value in increasing the weight of children and raising the hemoglobin. This delicious food also recommends itself for the calcium-phosphorus deficiencies of pregnancy, for prophylaxis against dental caries, for colitis and postoperative cases (it has a low residue), and for infant feeding. Its tasty flavor appeals to all.

**Oranges, tomatoes, etc. †Mead's Viosterol, Mead's Newfoundland Cod Liver Oil, Mead's 10 D Cod Liver Oil.*

MEAD JOHNSON & CO., Evansville, Ind., U.S.A.,—*Pioneers in Vitamin Research*

In a Service Pantry—

St. Luke's Hospital, Chicago

For service to their pavilion patients . . . Stewart's Coffee, made and served the Silex way . . provides a fresh, smooth, flavory coffee that pleases the most exacting taste, and eliminates complaints. A good coffee . . . served exclusively in outstanding hospitals everywhere.

Your inquiry is cordially invited

STEWART & ASHBY COFFEE CO.

843 W. Washington Blvd., Chicago, Ill.

Minneapolis, Minn.
Toronto, Canada

Palatability-Composition

Ease of Preparation
Availability—Cost

All important factors to be considered in selecting special foods. Seldom does one find as many desirable characteristics embodied in one product as there are in CELLU ONE-TWO-THREE FLOUR.

This flour is adaptable to many of your needs for low food value breads, as each muffin contains 1 gram carbohydrate; 2 grams protein and 3 grams fat. We would like to send you a carton for trial.

Send me free of charge a carton of Cellu One-two-three flour.

Name_____

Hospital_____

Address_____

A.D.A. 5-33

CHICAGO DIETETIC SUPPLY HOUSE

1750 West Van Buren Street
Chicago, Ill.

5 East 40th Street
New York City

(In writing advertisers, please mention the journal.)

Warn mothers not to rush the dawdler through her meals . .

Help find the real reason why she won't eat!

It isn't natural for children to pick at their food, to dawdle at the table.

When they do, it often means something is wrong with their appetite. Mothers make the mistake of thinking the child is to blame. Unwisely, they scold, beg, bribe, or coax.

The physician knows that frequently there's only one remedy. The child's diet does not provide enough of a factor which promotes good appetite. To restore normal, healthy hunger, the appetite-building factor — *Vitamin B* — must be given in abundance.

How can this be done? A pleasant way is with *Chocolate flavored Vitavose!*

Three heaping teaspoonfuls of Chocolate flavored Vitavose provide as much Vitamin B as a *whole quart* of plain milk.

Given regularly to children every day, Chocolate flavored Vitavose helps to make up the lack of Vitamin B in their diet and helps bring back their appetite.

It provides other factors they need — blood-building iron and all the other water-soluble minerals and nitrogenous compounds of wheat embryo.

Children who are pale and under-nourished thrive on it! It does them more good than the chocolate preparations which improve the taste of milk, which *flavor* it, but do not add much nourishment.

Have mothers give them Chocolate flavored Vitavose *daily!* It is delicious as a beverage with meals or after school.

For Infants—Vitavose and Dextro-Vitavose. These unflavored products, used as milk-modifiers, supply infants with abundant Vitamin B. Appetite and weight improve. Start babies on Dextro-Vitavose, the modified product, and gradually change to the richer Vitavose. Squibb Vitavose is *100* times richer in Vitamin B than milk. Unique among milk-modifiers. Recommend them routinely.

No wonder it helps restore normal hunger in children who won't eat! *Thirty times* as rich as milk in the appetite-stimulating factor—Vitamin B! Have mothers give it daily!

SQUIBB *flavored* CHOCOLATE VITAVOSE

A delicious blend of sucrose, 30% Vitavose (malted wheat germ extract), cocoa, skim milk, lactose; flavored with vanilla

(In writing advertisers, please mention the journal)

Dietitian's place in hotels and restaurants, The. J. O. Dahl..... $.12
Diets, weighed, Recipes for. Mary M. Harrington..... .15
Food administration, Standardization trends in. Isola Denman..... .15
Food atopy, So-called, On being poisoned by harmless foods. Jonathan A. Forman, M.D..... .15
Food clinic, How the, contributes to the medical care of the outpatient. Frances Stern..... .10
Food intake of hospital patients, A comparison of the, as purchased and prepared food methods for determining the. Florence H. Smith and Bertha J. Biltz..... .15
Food requirement of adolescent girls, Studies in the: I. The energy intake of well-nourished girls 10 to 16 years of age. Bernice Wait and Lydia J. Roberts.... .30
Food requirement of adolescent girls, Studies in the: II. Daily variations in energy intake of the individual. Bernice Wait and Lydia J. Roberts..... .15
German diet, Changes in the. R. R. Kuczynski..... .07
Hospital dietary department, The. S. Margaret Gillam..... .12
Hospital food bills, Economic analysis of. Ruth Wheeler and Vivian Moe..... .10
Hospital food bills, A nutritive analysis of. Ruth Wheeler and Edna Shalla..... .15
Hospital for chronic diseases, The. Mary W. Northrop..... .12
Hospital kitchens, Floor space, storage, and refrigeration in. Helen Hubbell and Mary de Garmo Bryan..... .22
Job analysis, Residence hall. Elizabeth Bemis, Lenna Cooper and Mary Walton..... .10
Labor study of full-time and part-time employees, A comparative. Mildred Enochs and Dale Yoder..... .10
Lunch, The hot school. Marietta Eichelberger..... .10
Meat diets, exclusive, Effect of prolonged use of. Walter S. McClellan, M.D..... .20
Meat, edible, amount of, as affected by methods of preparation, Determination of the Fay Burnett and Edna M. Shalla..... .05
Medical course, Nutrition training in the clinical years of the. H. S. Houghton..... .15
Mental hospital, The dietetic aspect of treatment in a. Alma E. Bering..... .10
Metabolism studies, A procedure for. Callie Mae Coons..... .10
Mexicans living in Texas, A dietary study of. Jet C. Winters..... .10
Milk, human, production, The present status of. B. Raymond Hoobler, A.M., M.D.. .25
Milk, Malted. James A. Tobey..... .10
Mineral additions to the soil, Correlation of copper and manganese content of plants and. Lila Miller and Helen S. Mitchell..... .10
Nephritic edema, Neutral diet in treatment of. F. H. Lashmet, M.D..... .10
Nitrogen, calcium, and phosphorus balances in late gestation under a specified dietary regime. Icie G. Macy, Eva Donelson, M. Louisa Long, Alice Graham, Mary E. Sweeny and M. Margaret Shaw..... .10
Nurse, The dietitian's relationship to the student. Irma Law, B.S., R.N..... .07
Nursing program, The dietitian and the public health. Shirley C. Titus..... .10
Nutrition in curriculum of school of nursing. Ethel M. Thompson..... .10
Nutrition, Interpreting, to industry. Laura Comstock..... .10
Nutritional investigation, A, with discussion of statistical interpretation. H. Louise Campbell..... .10
Nutrition, Some controverted questions in. John R. Murlin..... .15
Nutrition study, A, on an Indian reservation. Jessie Anderson Stene, M.D., and Lydia Roberts, M.S..... .12
Nutrition survey, A, in Labrador and Northern Newfoundland. Helen S. Mitchell, Ph.D..... .14

"THE HUMAN BODY

is born iron-rich but calcium-poor"

TOMATOES

VEGETABLE PUREE

IN AN ARTICLE, "The trend of recent advances in the chemistry of food and nutrition," appearing in the January, 1933, issue of the Journal of The American Dietetic Association (page 373), the importance of calcium and the vitamins is particularly stressed.

The article states with reference to calcium, "But while the human body is born iron-rich, it is also born calcium poor" . . . "Hence the extreme importance of liberal calcium intake for the growing child." In discussing vitamins, the article says, "a liberal intake of vitamin A has now been demonstrated to increase the ability of the body to resist a variety of infections." And, quoting further, "Vitamin G, like vitamins A and C, has been found to have important and far-reaching significance in nutrition. It shows increasingly beneficial effects up to intakes of several times the amount which would be accepted as representing the actual of minimal requirement."

CARROTS

SPINACH

Of the recognized "protective" foods, vegetables are recognized as primary sources of vitamins A, B and C and of the mineral salts. In the development of Certifoods Sieved Vegetables, every precaution has been taken to maintain in highest degree, not only the vitamin A, B and C values, but the content of mineral salts as well. The vitamin assays on Certifoods show that the exclusive Certifoods process maintains effectively the maximum vitamin values and preserves in high degree the content of mineral salts, particularly of calcium and phosphorus.

Based on definite laboratory research, the makers of Certifoods *guarantee* that these sieved vegetables contain vitamins A, B and C. These values are given in Sherman units for each variety printed on the label of every Certifood container. They are the only sieved vegetables with a definite *guarantee* of A, B and C vitamin content.

Certifoods Sieved Vegetables are sold in enamel-lined containers. Professional samples and literature will be sent to physicians on request. Please use the coupon.

GREEN PEAS

Certifoods, Inc.

Subsidiary of THE MALTINE COMPANY,
30 Vesey Street, New York, N. Y.

GREEN BEANS

CERTIFOODS SIEVED VEGETABLES

THE MALTINE COMPANY, *Certifoods Division*
30 Vesey Street, New York, N. Y.

Please send me professional samples and literature.

Name of Physician.....

Office Address.....

City or Town.....*State*.....

Maltine with Cod Liver Oil is the pleasant way for babies to take cod liver oil. Physicians have been prescribing this body-building and growth-promoting food for babies for more than 50 years.

(In writing advertisers, please mention the journal.)

Obesity diets, Significance of studies of ketosis and of nitrogen and water balance to. Jennie I. Rowntree ..... $.15
Obesity, Endogenous,—a misconception. L. H. Newburgh, M.D. and Margaret W. Johnston, M.D. ..... .22
Parent, Modern, attitudes and science. Ada Hart Arlitt ..... .15
Peanut meal, The composition of, and its use as a diabetic food. Margaret Mumford Neal ..... .15
Peptic ulcer with gastric mucin, The treatment of. Samuel J. Fogelson, M.D. ..... .15
Poisoning, Food. Edgar Erskine Hume ..... .15
Pregnancy, Diet and, M. L. Leventhal ..... .31
Pregnancy, lactation, and reproductive rest, Sources of nutrients chosen by women during. Carrol F. Shukers, Icie G. Macy, Eva Donelson, Betty Nims, and Helen A. Hunscher ..... .20
Purchasing, Legal and economic phases of. C. P. Slater ..... .10
"Scorby," Our fathers and the. Paul B. Shipley, M.D. ..... .17
Student nurses, Bedside teaching of. Helen J. Hubbell ..... .15
Tea, Japan green, The vitamin C content of. Helen S. Mitchell, Ph.D. ..... .10
Temperature at which foods may be served to hospital patients when insulated food conveyors are used, A study of the. Grace Carden and Eleanor T. Mussey ..... .15
Vegetables, The comparative cost of the preparation of, by machine and by hand in institutions. Helen A. Goodenow ..... .10
Vitamin G values of pasteurized milk, evaporated milk and eggs, A comparison of the. E. N. Todhunter ..... .10
Wheat, Muffins and cakes without. Ada M. Field, Bernice Gold and Helen Lundgren. .10
* Case histories as teaching material in diet therapy. Helen J. Hubbell.
* Standardized outline of courses in dietetics for student nurses. A sub-committee of the education section. Combination price 1.00

* These are reports of separate problems which have never appeared in the JOURNAL but have been printed for distribution.